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THE AMERICAN

GAS LIGHT JOURNAL

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BRIEFLY TOLD.

DEATH OF MR. GEORGE S. HOOKEY.—The younger members of the gas engineering fraternity of the United States will likely ask who George S. Hookey was, but their seniors will have little cause for draft on their memories as to his identity; and they will regret very much that his days on earth are ended. Born in Philadelphia, Pa., October 24th, 1819, he died in Augusta, Ga., the morning of the 18th inst., after residing in the latter city since 1853. Deceased, in the early days of the gas industry, was in the employment of the Messrs. Starr, who controlled the Camden (N. J.) iron works, and from whose shops graduated many of the hardy set that put permanently on its feet the business of making and selling gas in this country. In 1851 The Gas Light Company of Augusta, Ga., was incorporated, and its works were completed early in 1852. If our research is not at fault they were constructed under the guidance of Mr. Hookey, who was subsequently induced to accept the engineering management thereof, his term of such service dating from December, 1853. In this field of active labor he remained until 1894, with profit to the Company and with credit to himself. Deceased was a member of the American Gas Light Association since the meeting in Cleveland, O., May 13, 1874; and up to the time that age added so to the crippled limb, that hampered his physicality for many years, as to render him incapable of prolonged travel, he was always in attendance at its sessions. He is survived by two brothers, four sons and two daughters. The funeral services were held in Augusta on the afternoon of the 18th inst.

DEATH OF MRS. FREDERICK EGNER.—The sympathy of the craft will go out in unstinted measure to Mr. Frederick Egner, of Norfolk, Va., whose estimable wife died in that city, at an early hour of the morning of the 24th inst. Her death was peaceful release from the torment of a long-continued illness, which illness was borne with the fortitude and resignation that accompany to the end a life of rectitude and quiet. Deceased (who was a native of New York city) was united in marriage to Mr. Egner, November 26, 1868, and their partnership was of the sort which may be cited to prove that marriage is a sacrament rather than a contract. The last ceremonies were had in St. Luke's Episcopal Church, Norfolk, the afternoon of the 25th, the Reverend A. S. Lloyd officiating. Interment was made in Elmwood Cemetery.

THE KANSAS GAS, WATER AND ELECTRIC LIGHT ASSOCIATION.—Pursuant to a call for the assemblying, at Topeka, Kansas, on the 26th inst., of the officers of the various gas, water and electric light interests of Kansas, for the purpose of organizing an association for the advancement of the industries named, it is our satisfaction to report that the call was well responded to and that its object was attained. The attendance was representative and enthusiastic, and the net result of the proceedings may be thus summed up. The official title of the organization is that of "The Kansas Gas, Water and Electric Light Association," and its officers are:

President—L. T. Palmer, Leavenworth.
First Vice-President—A. T. Rodgers, Beloit.
Second Vice-President—E. S. Wills, Atchison.
Third Vice-President—F. D. Aley, Wichita.
Secretary and Treasurer—J. H. Foley, Leavenworth.

In due time we shall have more to say about the Association, as to its meeting times, records, and so on. Meanwhile we may remark that its President is the up-to-date Manager of the Leavenworth Light and Heating Company.

THE EDUCATIONAL FUND SUBSCRIPTION.—In our current issue (abstract of proceedings of the last meeting of the American Gas Light Association) will be found official matter respecting the fund subscribed for carrying on the educational work of the Association. We hope and believe that a calm reading of the same will impel further subscriptions to the fund, the standing of which at the present time is here appended:

Subscriber.	Total Amount Pledged.	Amount per Year Through 5-Year Period.
Akron (O.) Gas Light Company	$75	$15
American Gas Company, Phila., Pa	1,000	200
American Gas Light Journal	125	25
American Gas Light Association	...	250
American Meter Company, New York	250	50
Auburn (N. Y.) Gas Light Company	50	10
Austin (Tex.) Gas Light and Coal Company	50	10
Barber, Chas. W	10	2
Beal, Wm. R., New York	300	60
Binghamton (N. Y.) Gas Works	50	10
Blodget, C. W., Brooklyn, N. Y.	50	10
Buffalo City (N. Y.) Gas Company " " Gas Light Company " " Mutual Gas Light Co.	500	100
Clarke, Geo. S., Kansas City, Mo	50	10
Clark, Walton, Phila., Pa	600	120
Cleveland (O.) Gas Light and Coke Company	500	100
Collins, C. R., Seattle, Wash	10	2
Columbus (O.) Gas Company	125	25
Connelly Iron Sponge and Governor Co., N.Y.	50	10
Consolidated Gas Company, of New Jersey	100	20
Crisfield, J. A. P., Savannah, Ga	10	2
Curley, Thomas, Wilmington, Del	5	1
Daniels, Jno. M	25	5
Derby (Conn.) Gas Light Company	100	20
Detroit (Mich.) City Gas Company	200	40
Dunbar, J. W., New Albany, Ind	50	10
Equitable Gas and Electric Co., Utica, N. Y.	10	2
Grand Rapids (Mich.) Gas Light Company	125	25
Griffin, Jno. J. & Co., Phila., Pa	250	50
Helme & McIlhenny, Phila., Pa	250	50
Humphreys & Glasgow, New York and London	1,000	200
Jackson (Mich.) Gas Company	100	20
Keppelman, J. H., Reading, Pa	25	5
Knapp, Geo. O., Chicago, Ills	500	100
Laclede Gas Light Company, St. Louis, Mo	250	50
Lawrence, W. F., Trenton, N. J	25	5
Love, Dr. E. G., New York	50	10
Madison (Wis.) Gas and Electric Company	125	25
Maryland Meter & Mfg. Co., Baltimore	250	50
McDonald, D. & Co., Albany, N. Y.	250	50
Miller, A. S., New York	125	25
Milwaukee (Wis.) Gas Company	250	50
New Amsterdam Gas Company, New York	250	50
Nettleton, C. H., Derby, Conn	125	25
Norwich (Conn.) Gas Light Company	125	25
Old, G	25	5
Peoples Gas Light and Coke Company, Chicago.	500	100
Roots, P. H. & F. M. Co., Connersville, Ind	125	25
San Francisco (Cal.) Gas and Electric Company	750	150
Searle, R. M., Atlanta, Ga	25	5
Sherman, F. C., New Haven, Conn	100	20
St. Joseph (Mo.) Gas Company	75	15
St. Paul (Minn.) Gas Light Company	125	25
Tufts, Nathaniel, Meter Company, Boston	250	50
Turner, Thomas, Charleston, S. C	20	4
United Gas Improvement Company, Phila., Pa.	5,000	1,000
Vanderpool, Eugene, Newark, N. J	500	100
White, W. H., New York	125	25
Total	$.....	$3,448

NOTES.—The rate for a gas supply in Leavenworth (Kas.) since June 1, has been, on fuel account, $1 per 1,000 cubic feet; on illuminating account, $1.25 per 1,000.——Messrs. H. I. Drummond, John C. Porter, Jno. J. Dunham, Francis Kuhn and Charles Nelson are now in control of the Joplin (Mo.) gas and electric interests, which have been merged under the title of the Joplin Illuminating Company.

[ABSTRACT OF PROCEEDINGS.]

TWENTY-SIXTH ANNUAL MEETING, AMERICAN GAS LIGHT ASSOCIATION.

HELD IN THE INTERNATIONAL HOTEL, NIAGARA FALLS, N.Y., OCTOBER 19, 20 AND 21, 1898.

FIRST DAY, MORNING SESSION, OCT. 19.

The American Gas Light Association met in Twenty-sixth annual session, in the International Hotel, Niagara Falls, N. Y., at 10 A.M. of October 19. The Chair was occupied by the President (Mr. J. B. Crockett, of San Francisco, Cal.), and the Secretary (Mr. A. E. Forstall, of Montclair, N. J.), had charge of the recorder's desk. The call to order having been made, the President introduced Mr. Arthur C. Hastings, Mayor of Niagara Falls, who welcomed the Association in a pleasant speech. At the invitation of the President, Mr. M. S. Greenough, of Cleveland, O., responded to Mayor Hastings' welcome. The response of Mr. Greenough was notable for the clever way in which he referred to the good work that had been accomplished by the Association from its formation, and his disclaimer that gas companies had anything to conceal or suppress from the public in the carrying on of their business.

The President having called for the regular order of business, on motion the reading of the minutes of the last meeting was dispensed with, and the Secretary read the following

REPORT ON APPLICATIONS FOR MEMBERSHIP,

and transfers from associate to active membership, etc., as submitted by the Council:

NIAGARA FALLS, N. Y., Oct. 19, 1898.

To the American Gas Light Association: Gentlemen—Your Council has approved the following applications for membership, and submit them to you with a recommendation that they receive favorable action:

Active.

Aldrich, W. A., Spokane Falls, Washington; Secretary and General Manager Spokane Falls Gas Light Company.

Andrews, J. Charles, 19th and Allegheny avenues, Philadelphia, Pa.; Superintendent of Meters, United Gas Improvement Company, Philadelphia Gas Works.

Bailey, Wm., Oskaloosa, Iowa, Secretary and Manager Oskaloosa Gas Company.

Battin, H. S., 4,257 Frankford avenue, Philadelphia, Pa.; District Superintendent (distribution) United Gas Improvement Company.

Boore, Louis A., Niagara Falls, N. Y.; Secretary Niagara Falls Gas Light Company.

Buck, H. M., Peru, Indiana; Superintendent Peru American Gas Company.

Cathels, Wm. M., Brantford, Ontario; Manager Brantford Gas Company, Ltd.

Chandler, W. G., 30th and North Third streets, Harrisburg, Pa.; Agent and Superintendent, The United Gas Improvent Company, Harrisburg Gas Works.

Clahan, John J., 133 Whitney place, Buffalo, N.Y.; Superintendent of People's Gas Light & Coke Company.

Clements, John, Red Bluff, California; Secretary Red Bluff Electric Light and Gas Company.

Cline, W. B., Los Angeles, California; President Lost Angeles Lighting Company.

Cross, Philip, Detroit Club, Detroit, Mich.; Assistant General Manager Detroit City Gas Company.

Dawes, Beman G., Newark, O.; President and Treasurer Newark Gas Light and Coke Company and Lansing Gas Light Company.

Donahue, E. J., 813 Drexel Building, Philadelphia, Pa.; Consulting Engineer, Sioux Falls Gas Lignt Company, Sioux Falls, S. D.

Douthirt, W. F., 40 Wall street, New York City; Assistant Secretary Buffalo City Gas Company.

Dunderdale, Thos., 23 Sparks street, Ottawa, Canada; Superintendent Ottawa Gas Company.

Dutton, Lewis R., Wyncote, Pa.; Superintendent The Jenkintown and Cheltenham Gas Company.

Gartley, Alonzo, 813 Drexel Building, Philadelphia, Pa.; Consulting Engineer Johnstown and Gloversville Gas Company.

Hadden, James M., Poughkeepsie, N. Y.; Manager Poughkeepsie Gas Works.

Hall, Arthur H., 350 Alexander avenue, New York City; Superintendent of Distribution, Central Union Gas Company.

Hoffmann, G. Max, Fort Wayne, Ind.; General Superintendent Fort Wayne Gas Company.
Humphreys, James J., Jr., Worcester, Mass.; Superintendent Worcester Gas Light Company.
Jones, T. C., Delaware, Ohio; Superintendent and Secretary, Delaware Gas Company.
Kempf, Jno. J., Salt Lake City, Utah; Salt Lake and Ogden Gas and Electric Light Company.
Knapp, Isaac N., 20th and Center streets, Omaha, Neb.; Superintendent Omaha Gas Company.
Knight, D. E., Marysville, Cal.; President Marysville Gas Company.
Lawrence, W. F., Trenton, N. J.; Superintendent Trenton Gas Light Company.
Littlehales, Thos. G., Hopkinsville, Ky.; Lessee and Manager Hopkinsville Gas and Lighting Company.
Mayers, J. A., 131 Lafayette avenue, Detroit, Mich.; Superintendent of Streets, Detroit City Gas Company.
McLean, George; Secretary Key City Gas Company, Dubuque, Iowa.
Merrifield, L. L., 157 Dowling avenue, Toronto, Canada; Gas Engineer, Canadian Gas Association.
Moore, Northrop, Kansas City, Kansas; Superintendent Wyandotte Gas Company.
Morrison, H. K., Concord, N. H.; Superintendent Concord Light and Power Company.
Norton, Walter F., 55 Concord street, Nashua, N. H.; Superintendent Nashua Light, Heat and Power Company.
Parker, Richard M., 420 Market street, McKeesport, Pa.; Treasurer McKeesport Gas and Improvement Company.
Parker, T. R., Napa, Cal., General Manager Napa City Gas Light and Heating Company.
Quilty, C. W., San Jose, Cal.; President San Jose Light and Power Company.
Rosenthal, Albert, 1315 Filbert street, Philadelphia, Pa.; Superintendent of Special Mains, Philadelphia Gas Works, U. G. I. Company.
Ross, J. Chas., Port Chester, N. Y.; Superintendent Westchester Gas and Electric Company.
Rossman, G. M., Keene, N. H.; Treasurer Keene Gas Light Company.
Scott, Wm. M., Lewiston, Me.; Superintendent Lewiston Gas Light Company.
Shattuck, John D., 720 Ellincott square, Buffalo, N. Y.; Engineer of Distribution, Peoples Gas Light and Coke Company.
Spragle, L. D., Johnstown, N. Y.; Superintendent Johnstown and Gloversville Gas Company.
Thomas, John W., Vallejo, Cal.; Superintendent Vallejo Gas Light Company.
Tuthill, J. B. T., Salem, Oregon; Salem Gas Company.
Wakeman, E. A., Batavia, N. Y.; Superintendent Consolidated Gas and Electric Company.
Wales, Harry B., Grand Rapids, Mich.; Chief Clerk Grand Rapids Gas Light Company.
Wells, L. W., Canton, Ohio; Superintendent Canton Gas Light and Coke Company.
Whipple, Henry S., Rockford, Ills.; Superintendent Rockford Gas Light and Coke Company.
Whittaker, Alan Dean, Paterson, N. J.; Assistant Superintendent, The United Gas Improvement Company.
Williams, L. S., 706 North 8th street, Sheboygan, Wis.; Superintendent Sheboygan National Gas Company.
Witherby, Edwin E., Lockport, N. Y.; Superintendent and Secretary Lockport Gas and Electric Light Company.
Woodward, Ralph, New Rochelle, N.Y.; Superintendent New Rochelle Gas and Fuel Company.

Associate.

Alcott, Franklyn L., Cleveland, O.; General Manager and Secretary, The Standard Lighting Company.
Atwater, Christopher G., Syracuse, N. Y.; Engineer Semet-Solvay Company.
Bartlett, D. Lewis, care Bartlett, Hayward & Company, Baltimore, Md.; manufacturer gas works apparatus.
Battin, Wm. I., 3,701 Powelton avenue, Philadelphia, Pa.; Foreman of Mains, West Philadelphia District, Philadelphia Gas Works, U. G. I. Company.
Bayles, Jas. C., M.E., Ph.D., 14 Cortlandt street, New York City; Chief Engineer Bayles Engineering Company.
Coleman, H. W., 625 Drexel Building, Philadelphia, Pa.; Eastern Agent Kerr Murray Manufacturing Company.
De Hart, J. S., Jr., 46 Bridge street, Newark, N. J.; Engineer with Isbell-Porter Company.
Duck, Geo. F., 1 Broadway, New York City; Gas coal agent, Peale, Peacock & Kerr.
Floyd, Jas. R., Jr., 539 West 20th street, New York City; member of firm of Jas. R. Floyd's Sons.
Osborne, Williard B., Allegheny, Pa.; Constructing Engineer, Riter-Conley Company.
Poole, Herman, New York City; Consulting Chemist and Engineer.
Summey, D. L., Wyncote, Pa.; Engineer, The Jenkintown and Cheltenham Gas Company.
Trenkamp, H. J., Cleveland, O.; Secretary, The Schneider & Trenkamp Company.
Wehner, R. K., 46 Bridge street, Newark, N. J.; Manager Isbell-Porter Company.

Transfers from Associate to Active.

Knight, C. S., Murfreesboro, Tenn.; Secretary Murfreesboro Gas and Electric Light Company.
Randolph, William W., 31 Nassau street, New York City; Assistant to the President, Syracuse Gas Company, N. Y., and City Gas Company, of Norfolk, Va.

Respectfully submitted for the Council,
J. B. Crockett, President,
A. E. Forstall, Secretary.

Election of New Members.

On motion of Mr. A. C. Humphreys, the Secretary cast the ballot of the Association in favor of the election to membership of the applicants reported by the Council. The President welcomed the new members, and then called for the

Annual Report of the Council,

which the Secretary read as follows:

Niagara Falls, N. Y., Oct. 19, 1898.

To the American Gas Light Association—Gentlemen: Your Council has the honor to make its annual report as follows: A separate report upon applications for membership recommends the election of 67 applicants. The resignations of ten active and two associate members have been received and accepted.

The following list of papers has been approved to be read at this meeting:

"Depth of Fire in a Water Gas Set," by J. M. Rusby, Jersey City, N. J.

"Notes on Mains and Main Laying," by Walton Forstall, Philadelphia, Pa.

"The Loss of Illuminating Power of 25 to 30-Candle Gas when Mixed with Air," by Dr. E. G. Love, New York City.

"Can We Make All Our Business Pay?" by A. E. Forstall, Montclair, N. J.

"How can we Make the Use of Gas for Cooking More Universal?" by Henry L. Doherty, Madison, Wis.

A Committee of the Council has been employed for the past year in devising ways and means for carrying on the work of the Educational Committee, which Mr. Walton Clark, its Chairman, has been compelled to relinquish. Upon the report submitted to the Council last night, the Council recommends to the Association that action be taken as follows:

That a Board of Trustees be formed to administer the funds to be collected, and to have full charge of the educational work, including the employment of the working force; the Trustees to have full authority in the premises.

That the Board consist of three members appointed by the Association from its membership, and of the President and Junior Past President of the Association *ex officio;* vacancies to be filled by the Trustees themselves.

That the three members to be appointed by the Association be as follows: Walton Clark, Eugene Vanderpool, W. F. Douthirt.

The Council recognizing the self-sacrifice, zeal and ability displayed by Mr. Walton Clark in carrying on the work of the Committee on Education, from February, 1896, to June of this year, recommends a special vote of thanks to Mr. Clark for his labors in the field, and for demonstrating that such an educational scheme can be carried out to the benefit of many a deserving and struggling man.

The medal offered by Mr. Beal, to be presented to the writer of the

best paper presented at each meeting, has been struck off and handed to the Council for presentation as decided by the proper committee.

Respectfully submitted,

J. B. Crockett, President.
Alfred E. Forstall, Secretary.

On motion of Mr. Shelton, the report and recommendations contained therein were received and adopted.

Appended to this report of the Council was the

Report of Committee of Council to Devise Means for Continuing the Educational Work of the Association.

Niagara Falls, N. Y., Oct. 18, 1898.

To the Council of the American Gas Light Association—At the annual meeting in 1896 a Committee was appointed by the Council to consider the questions which had arisen in connection with the difficulties which had been experienced in properly filling the office of Secretary, in view of the large amount of work and responsibility attached to the office, and of the inability of the Association to offer an adequate compensation therefor. At the next spring meeting this Committee reported progress.

At the annual meeting following (1897) this Committee in reporting pointed out the difficulty likely to be soon experienced in the carrying on of the work of the Educational Committee, through the inability of Mr. Walton Clark to continue his labor of love as Chairman and working member of the Committee. This Committee then pointed out the possible relationship between these two subjects, viz., the Secretaryship and the educational work of the Association.

At the following meeting (spring of this year) this Committee laid before the Council a fairly definite scheme for the continuance of the educational work, through a Board of Trustees to work without compensation, but to be authorized to engage the services of a competent Secretary to act as instructor, the expenses of the Trustees (chiefly the salary of the Secretary) to be met by subscriptions from gas companies and individuals, to extend over five years, and thus to insure the continuance of the work for that time, the amount to be so pledged to be not less than $3,000 per annum. This scheme was in general approved by the Council, and this Committee was instructed to proceed along the lines so laid out, and to report finally at this meeting.

In accordance with these instructions, your Committee in June last issued the attached circular and subscription form[1] and placed them generally before the gas companies of the United States, and before firms and individuals connected with our business.

In response to this appeal and to the personal appeals made by the members of your Committee, annual subscriptions have been already pledged to the amount of $3,193. The subscription list is attached.[2]

It is to be noted that the response has not been as general as might be wished, but your Committee trusts that this may be in part corrected by the receipt of further subscriptions now under consideration. In view of the possibility of some of the subscriptions being canceled before the five years have elapsed, your Committee considers that it is extremely desirable that the subscription list should be kept open. Any amount which may be obtained in excess of the anticipated requirements can be well invested as a permanent fund to form the nucleus for the subscriptions five years hence, when we feel sure the value of this work will have been demonstrated and the necessity for continuing it will be manifest.

It is also desirable that we should have something in excess of the $3,000 per year, for it is contemplated that this amount will be required for the salary of the Board's permanent Secretary, and the Board will be at some little expense for printing and postage, which has in the past amounted to about $250 a year. This item, it is quite likely, will be necessarily increased, and certainly will be if the class increases in size, as now appears likely.

The Association for the three years past has reimbursed the Educational Committee for its actual cash expenditures in this line, and we might, therefore, continue to ask the Association to appropriate sufficient to cover these petty expenditures. The Association can well afford to appropriate $250 per year for this purpose, and we suggest a recommendation to this effect.

One of the objections your Committee has had to meet in filling up the subscription list has been the reluctance of some, and especially individuals, to pledge themselves to an annual payment extending over such a considerable time as five years. We would, therefore, suggest the advisability of endeavoring to obtain subscriptions of lump sums, to be paid in without pledge as to the future, it being understood by the Trustees that such amounts shall either go with a general fund, the interest alone of which shall be used, or that not more than one-fifth of such lump sum subscriptions shall be appropriated in any one year. This has been the disposition of the lump sum subscription already made. We feel sure that if this feature is clearly placed before the members of the Association, either by this Committee or by the Trustees when appointed, the result will be to considerably swell the subscription list, and to considerably widen the interest in the scheme.

Your Committee suggests that the Council recommend to the Association the formation of a Board of Trustees to administer the funds to be collected, and to have full charge of the educational work, including the employment of the working force; the Trustees to have full authority in the premises.

We would further suggest that the Council recommend that the Board consist of three members appointed by the Association from its membership, and of the President and junior past President of the Association, *ex officio;* vacancies to be filled by the Trustees themselves.

Your Committee further suggests that the Council recommends to the Association the following members for the Board of Trustees: Walton Clark, Eugene Vanderpool and W. F. Douthirt.

We further suggest for recommendation to the Council that authority be given to the officers of the Association to perform such acts on behalf of the Association as may be necessary or desirable in connection with the creation of the Board of Trustees of the Educational Fund.

Your Committee, while not charged with responsibility in the matter of the selection of a proper person to act as Secretary of the Board of Trustees, found it necessary to look far enough into this question to determine whether or not the proper man could be obtained at the salary contemplated, viz., $3,000 per annum. We also found that many of the subscribers wished to be assured that the proper material was available.

Recognizing the desirability of coupling together the work of the Secretaryship of the Association with this educational work, in case the Secretary of the Association was a man properly equipped by training and temperament for the educational work, and recognizing that the present Secretary is peculiarly fitted to fill both offices, we felt warranted in sounding him on the subject, and we are happy to be able to report that if he is appointed to both of these offices he will be prepared to take up the work and devote himself almost exclusively to the duties of the two offices. He will under these circumstances expect to do consulting work, but his first care will be the work of the Association and of the Educational Board. It is understood that if this arrangement is consummated Mr. Forstall will receive the same salary from the Association as at present, and will be reimbursed for cash expended for printing, postage, etc., as at present. He would expect to hire an office in New York city at his own expense, and would establish therein headquarters for the Association and for the Educational Board.

In concluding this report we wish to again refer to the self-sacrifice, zeal and ability displayed by Mr. Walton Clark in carrying on the work of the Committee on Education from February, 1896, to June of this year. Few understand the amount and quality of this work.

We suggest that the Council recommend to the Association a special vote of thanks to Mr. Clark for his labors in the field, and for demonstrating that such an educational scheme can be carried out to the benefit of many a deserving and struggling man.

Respectfully submitted, Alex. C. Humphreys, Charles H. Nettleton, George G. Ramsdell, } Committee.

Report of the Treasurer.

The Secretary read the annual report of the Treasurer and Secretary. The financial statement showed that the total receipts for the year (ended Sept. 30, 1898) had been $2,739.19; that the expenditures had been $2,459.25; that the balance was $279.94. The statement of the Secretary showed that the total membership was 441, and that 7 members had died during the year. The certification of the Finance Committee (Messrs. A. C. Humphreys, Geo. G. Ramsdell and E. G. Pratt) accompanied the Treasurer's accounts.

Mr. Walton Clark then read the following

Report of the Committee on Education.

To the American Gas Light Association—Your Committee have to report as follows: During the class year beginning December 1st, 1897, there was issued to the students of the class but one list of questions and answers. The Committee regret to have to report that, owing to press of other duties upon the members of the Committee, they were unable to carry the work of the class beyond the issuing of this first series of questions and answers. Realizing that the continuation of

1. See Journal, Aug. 1, 1898, p. 154.
2. See Journal, current issue, p. 630.

the class depends upon the securing for it the entire services of some one competent person, an effort has been made during the year to secure a fund for the employment of a suitable man for this work, and to insure the carrying on of the work during the next 5 years. A report of the success of this attempt will be made you by Mr. Alex. C. Humphreys, who is Chairman of the Committee, appointed to make the effort to secure the funds referred to above.

The class at the beginning of the year, December 1, 1897, numbered 56. Those who answered the first list of questions, and who properly may be regarded as the members of the Class as at present existing, numbered 59.

There are 18 applications on hand for membership for the year beginning December 1, 1898.

If the present members of the Class continue their membership the Class at the beginning of the new year will number at least 77. It is probable that applications will come in between now and the 1st of December.

The interest in the work has continued, and there were many expressions of regret from members of the Class when it was decided that temporarily the work would have to be abandoned. These men are now all anxiously awaiting your action. Upon the success of the plan referred to above for securing the services of some person to carry on the work will depend the opportunity of these men to continue a work from which they have been deriving great benefit, and which they would be very sorry to lose. The benefits of the members of the Class, and your Committee believe to the American Gas Light Association, are out of all proportion to the amount of money expended.

The expenditures for the Class for the year have been $100, or $1.70 per member per year.

WALTON CLARK, Chairman,
A. C. HUMPHREYS,
GEO. G. RAMSDELL,
CHAS. H. NETTLETON,
ALFRED E. FORSTALL,
} Committee.

On motion the report was accepted.

The President called upon Mr. A. C. Humphreys to explain at greater length the manner of raising the fund and how it was proposed to administer it.

Mr. Humphreys then gave a detailed statement on the lines indicated by the President's invitation, putting especial stress on the fact that the Committee would be glad to receive subscriptions, no matter how small, in lump sums from those who did not wish to declare themselves for a subscription covering so much per annum for a period of 5 years. He was quite sure that the work proposed would be very helpful to the gas industry at large. Mr. Humphreys' statement was interrupted frequently by applause.

Gen. Harbison explained that Trinity College, Hartford, Conn., was arranging for a course in gas engineering, which determination was prompted largely by the speaker's arguments. The Hartford Gas Light Company would substantially assist the College in carrying the proposed gas engineering course to success.

Mr. Jno. H. Keppelman, of Reading, Pa., made a subscription ($5) to the fund, after which, on motion of Mr. W. R. Beal, the Association extended to Mr. Walton Clark, by rising vote, an expression of its appreciation of his sustained, successful and self-sacrificing efforts in connection with its educational work.

Mr. Alten S. Miller read the following

REPORT OF THE COMMITTEE ON RESEARCH.

To the American Gas Light Association: Gentlemen—Your Committee would like to thank the members who have so kindly prepared papers on some of the subjects suggested at the last meeting, and hope that the members will discuss the subjects freely and fully. Much good can be accomplished by going thoroughly into a subject when it has once been opened, and we hope that the members will not feel that it has been exhausted until all the facts bearing on it have been placed on record.

Of the subjects suggested last year, we are promised papers bearing on the following: "The Self Enrichment of Coal Gas;" "The Effect of the Depth of Fire in the Practical Efficiency of a Water Gas Generator;" "The Loss of Illuminating Power of 25 to 30-Candle Gas Mixed with Air." This leaves untouched the following subjects: "The Measurement of High Temperatures;" "The Production and Separation of Cyanides;" "The Removal of Tar from Water Gas;" "The Effect of Regenerative Benches and Anti-dips on the Production of Ammonia."

Another subject for investigation has been suggested by our Secretary which is, "At What Point Should the Coal and Water Gas be Mixed in a Combination Works to Insure the Best Results?"

We hope that there are enough members of the Association who have its interests at heart sufficiently to present papers on these subjects at the next meeting. Meanwhile other subjects for research should be suggested, and your Committee will be under obligations to anyone who will suggest such subjects.

A table for house piping has been prepared according to the instructions given at the last meeting. This table is based on a loss of pressure of 1 inch of water in 500 feet. The table has been published and distributed among the members.

We recommend the adoption of the standard gas works castings of the Society of Gas Lighting. These standards have recently been modified by the Society as follows:

1. The diameter of the bolt circle on the 30-inch flange has been changed from 34½ inches to 35 inches.

2. The lead groove in the hub has been turned around so that the deepest indentation is towards the face of the hub instead of the bottom as before. The distance from the face of the hub to the groove is ½ inch, and the groove is ¾ inch long as before.

3. The following weights for pipe are suggested for ordinary work:

Size.	Weight per 12-Ft. Length.
4 inch	220 pounds.
6 "	350 "
8 "	490 "
10 "	570 "
12 "	860 "
16 "	1,326 "
20 "	1,900 "
24 "	2,400 "
30 "	3,400 "

Respectfully submitted,

ALTEN S. MILLER,
CHAS. F. PRICHARD,
} Committee.

Mr. Miller further explained that Mr. Geo. T. Thompson, the third member of the Committee, had, through illness, been unable to sign the report. He had, however, been able to induce members to prepare papers for the Association.

On motion of Mr. Nettleton, the report and its recommendations were adopted. It was also voted to continue the Committee.

Mr. A. C. Humphreys here called attention to the fact that the recommendation made by the Council, that the Association appropriate out of its fund the sum of $250 per annum towards sustaining the educational fund had not been disposed of. On motion of Gen. Harbison the Association voted to appropriate the sum above named toward the purpose specified.

REPORT OF COMMITTEE ON NOMINATIONS.

The President called for the report of the Committee on Nominations, which was read by Mr. Clark.

To the American Gas Light Association: Your Committee on Nominations have the honor to report the following nominations of officers to serve during the Association year, beginning with the adjournment of this meeting:

President—Mr. Alexander C. Humphreys.
First Vice-President—Mr. Geo. G. Ramsdell.
Second Vice-President—Mr. E. G. Pratt.
Third Vice President—Mr. William R. Beal.
Secretary and Treasurer—Mr. Alfred E. Forstall.
Members of Council (to serve two years)—Messrs. Rollin Norris, Malcolm S. Greenough, C. H. Dunbar and S. J. Fowler.

WALTON CLARK, Chairman,
H. C. ADAMS,
FREDERICK EGNER,
H. B. LEACH,
C. R. FABEN, JR.,
} Committee.

ELECTION OF OFFICERS.

On motion of Capt. White, Mr. Clark cast the ballot of the Association in favor of the election to office of the gentlemen named. President-elect Humphreys suitably acknowledged the honor conferred upon him.

On motion of Capt. White, the President named the Committee to select the next place of meeting—Messrs. C. J. R. Humphreys, L. L. Kellogg and E. H. Jenkins. Gen. Harbison here said he hoped the Committee would name Hartford. The Secretary read several invitations to visit points of interest in and about Niagara Falls and nearby places. On motion of Mr. Neal, the invitations were accepted with thanks.

Vice-President Humphreys assumed the Chair, and President Crockett delivered his

INAUGURAL ADDRESS.

(For President Crockett's Address, see JOURNAL, Oct. 24, p. 594.)

On motion of Mr. Boardman the Address was referred to a committee of five (Messrs. A. E. Boardman, John McIlhenny, D. H. Geggie, B. E. Chollar and J. M. Rusby) for consideration and report.

A recess, until 2 P.M., was then ordered.

FIRST DAY, AFTERNOON SESSION.

The Association reconvened at the time appointed. The proceedings were opened by the President announcing the following

COMMITTEE TO AWARD THE BEAL MEDAL.

Messrs. M. S. Greenough, W. H. White and A. E. Boardman.

The President introduced Mr. Henry L. Doherty (General Manager of the Madison Gas and Electric Company, of Madison, Wis.), who read the following paper on

HOW CAN WE MAKE THE USE OF GAS MORE UNIVERSAL?

We are all anxious to extend the use of gas for cooking both by putting out more stoves and by inducing present consumers to use gas for this purpose to the exclusion of all other fuels, regardless of seasons. I will treat this subject from the negative side, and as a basis of argument, will state in the order of importance the reasons why I assume the use of gas is not more general for this purpose during the summer season.

First. Lack of appreciation on the part of the public of the real merits of gas for cooking.

Second. General belief that it is more expensive than it really is.

Third. Procrastination.

Fourth. Cost of making installation.

Fifth. The use of incomplete and unsatisfactory gas stoves.

Sixth. Fear of a gas stove.

Seventh. Dislike to abandon the use of a good coal, wood or gasoline stove.

Eighth. Our present inability to provide consumers with hot water for bathing and other purposes at a moderate cost, and in a satisfactory manner.

Ninth. The difficulty in disposing of garbage.

The reasons why I assume gas is not used for the entire year are, in the order of their importance, as follows:

(*a.*) The failure of our consumers to see any advantage in the use of gas, except during the heated season.

(*b.*) No provision for heating kitchen except by cook stove.

(*c.*) The great relative economy in use of coal or wood at times when heat must be provided for the kitchen.

Any other reasons for not using gas during the winter are embraced in those enumerated as applying to the use of stoves in summer.

Reason No. 1.—(Lack of Appreciation on the Part of the Public of the Real Merits of Gas for Cooking.)—It is quite apparent that many people regard a gas stove as a toy, and fail to appreciate that it will not only cook as well as any other stove, but will do its work much better and quicker. Many people do not quickly make friends with new appliances, and evidence is so plenty in support of this statement that argument is superfluous. Advertising, soliciting and demonstrating, I believe, will most readily enable us to convince the public of the merits of gas stoves. How to advertise, solicit and demonstrate will be treated under another head.

Reason No. 2.—(General Belief that it is More Expensive than it Really is.)—There is a general belief that gas for cooking is extremely expensive. This is not surprising when you know that many of your customers are criminally careless, and it is also a peculiar fact that these women evidently pride themselves on the magnitude of their gas bills. Instead of remaining at home and taking care of their house, they spend their time gossiping with neighbors or friends, and are always sure to state that their gas bill for cooking comes to between $4 and $5, whereas if they would tell the truth they would be compelled to admit that their highest bill was $4.05, and their average bill less than $2.50. Women seem prone to exaggerate, and they seem particularly anxious to exaggerate their gas bills, feeling that this is another way to tantalize their more frugal neighbors. They seem to forget that in the eyes of some they are simply advertising their own carelessness.

Half the complaints from high bills are due to carelessness, and little can be done to cut down the bills, although a communication addressed to our present consumers, asking them to be careful in quoting their bills, and to confine themselves to the exact truth, and to always give their average bill, would probably eliminate some of this gossip about high gas bills.

There are other high bills that can be cured. Some are due to careless or ignorant servants with careful mistresses, and sometimes the trouble is in the stove. Careful attention and instructions to these servants will often remedy matters. I have found the registering complaint meter a valuable aid in determining when the excessive consumption occurred, and, by investigation, was easily able to determine the class of service which caused an excessive consumption of gas. Before adopting these registering meters for complaint work we would read the meters each day, where consumers were dissatisfied, to locate time and excessive consumption.

To those who have never tried this plan I can assure them that this practice, executed by a clever man, will prove quite efficacious in many instances. I venture the statement that gas sold at $1.25 per 1,000 for fuel purposes, where the stoves and consumers are carefully watched, will develop less dissatisfied consumers than to sell gas for $1 per 1,000 and pay no attention to complaints. In support of this statement, I affirm that a larger percentage of gas stoves have been abandoned in Columbus, Ohio, where natural gas is used, having 1,100 B.T.U. per foot, and costing 20 cents per 1,000, than in Madison, Wis., where we sell ordinary mixed coal and water gas at $1.25 per 1,000.

When several gas appliances are used, and parties are dissatisfied with their bills, it is quite an easy matter to locate the heavy consumption by putting a meter on each appliance.

Since having enjoyed the opportunity of becoming acquainted with the two meter system, I have become an advocate of this plan. Two bills do not look as large as one to the consumer, and they require very little more work than one.

The consumer knows the exact cost of each service, and can better locate the cause for any increase. The company can accurately determine results from a campaign for either illuminating or fuel consumption, and you can readily determine when a gas stove is not in use, and take measures to induce customers to again resume its use.

I believe it good policy to watch consumption on new stoves, and if an excessive bill comes in the first month make a thorough examination of the stove, re-instruct the operator, and have the meter read weekly until the bill is reduced to the proper point. If this method fails to reduce the consumption to the satisfaction of the customer, it would probably be well to change the stove.

High gas bills are often occasioned by an excessive draft, causing over-ventilation of the oven burners. When a range is connected to a flue we generally look out for this trouble, and, if suspected, we arrange the flue pipe as shown in Fig. 1. This seems to effectually prevent this trouble, and often cures an oven burner from smothering, although where this trouble is met, I would recommend an arrangement as illustrated in Fig. 2. One or both of these arrangements is patented by an Eastern concern; but think you need have no fear of using them, as I have resorted to their use prior to the organization of the concern that claim them as their patents.

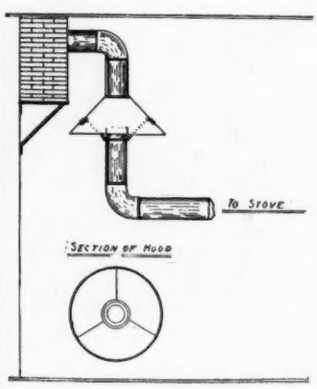

Fig. 1.

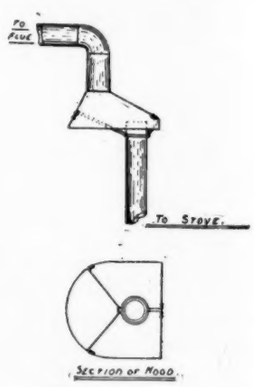

Fig. 2.

To prevent people from quoting their highest, rather than their lowest, bills it would in many instances pay to send them a statement at the end of the year or season, showing them their monthly aggregate and average consumption, keeping a record of these statements carefully indexed for the use of solicitor, in case some lady tells of the excessive bills of "Mrs. Gossip."

Insufficient pressure very often adds materially to the cost of operating a stove. Theoretically, high pressure will insure a more intimate mixture of gas and air, and will also increase the rapidity of flow, both tending to produce higher flame temperature, and your economy will

generally increase as you increase the differential temperature between the flame and the object absorbing the heat. Decreased pressure necessarily means decreased flow, and decreased flow generally means an increased volume of gas for a given result. For instance, you take two quarts of water in a stew pan and place it over a stove burner consuming gas at the rate of 4 feet an hour; before your water reaches boiling temperature you will have consumed nearly twice the quantity of gas required to bring the water to the boiling point had gas been consumed at the rate of 12 feet an hour. Economy increases with increased rate of consumption up to a certain point, and this point is seldom exceeded, provided the burner is properly designed to produce the highest possible flame temperature. Many high bills are occasioned by inadequate consumption, due to low pressure, small sized gas orifices, or by operator using gas at less than full head, under the mistaken belief that this plan is conducive to economy. The use of a meter, placed on the piping to the stove directly under the observation of the operator, should be the most effective method to teach the operator how to practice economy, and the use of a prepayment meter at this point should insure their attention to their gas consumption. I wish the meter manufacturers would add another dial to their meters showing the consumption of 100 feet on a complete revolution, with 10 feet divisions. There are many times when this dial would prove advantageous, and no reason except custom for not inaugurating the change, barring the increased expense, which would probably amount to less than 2 cents per meter. I know there are few of our friends in the meter business who cannot appreciate the advantage of this change, and I hope some of them are progressive enough to adopt it, and so announce themselves at this meeting.

If the stove men will increase the height of their ovens so they will accommodate two tiers of bread, they will enable large families to obtain more economical results, and the large families are generally the ones who have the high gas bills.

Reason No. 3.—(Procrastination.)—People will procrastinate, and you cannot overcome this fault by putting in services free, giving away gas stoves, or reducing the price of gas. Here is one of the fields where the solicitor is invaluable.

Reason No. 4.—(Cost of Making Installation.)—The fact that the cost of the installation is a hindrance to the adoption of gas for fuel does not necessarily mean that we should put in services and stoves at the gas company's expense. Most managers seem to think this the only reason, or at least the main reason, why the use of gas is not more universal. I have never yet seen the results from the plan of free installations that would warrant this belief. The giving away of stoves, or selling them greatly below cost, I think, is a short-sighted, unbusiness-like policy, except under conditions that are seldom apparent. What we should do is to create a desire in the public for gas stoves, and they will find some way to get them. The bicycle business so thoroughly supports this assertion that it seems hardly necessary to indulge in a lengthy argument here. Giving away gas stoves, or selling them cheap, merely puts them a little nearer within the reach of those who want them, but only in a measure creates a greater public appetite for them. I believe we should devote more of our energy toward creating the want, being justified in feeling that they are more likely to supply it than to cultivate it. It is doubtful if the average gas company can afford to make free installations. It undoubtedly breeds an undesirable idea with the consumer regarding your margin of profits, and, as most articles are valued by their cost, you can hardly expect that your patrons will attach much value to a free service or stove, or display much patience with the stove if it temporarily fails to give satisfaction.

Reason No. 5.—(The Use of Incomplete and Unsatisfactory Gas Stoves.)—We cannot expect gas stoves to be used continuously unless they perform satisfactory work and are sufficiently large and complete to do all the work required of any stove. In a great many cities a large portion of the users of gas for cooking have a 2 or 3-burner hot plate, which is connected up with tubing and placed on their coal range. On Mondays the coal stove must be used for washing, and this necessitates disconnecting the hot plate; on Tuesdays the ironing must be done and the coal stove used; on Wednesdays the baking must be done; so for the first three days of each week all of the cooking is done on the coal range, and unless it is very warm for the balance of the week the hot plate remains idle until the weather demands its use. A good gas range in good working order will probably be used continuously seven days in the week and five months in the year, and possibly for the entire year. It would seem wise to discourage the adoption of hot plates and encourage the purchase of well-built, good-sized gas ranges.

Reason No. 6.—(Fear of a Gas Stove.)—There are many people who are afraid of a gas stove. They fail to distinguish between gasoline and gas in the accidents that are reported in the daily papers. On the other hand, many of them do not understand the difference between gas and gasoline, and feel that if there is danger in the use of one the other must also be dangerous. There are many women so nervous that the snapping of a toothpick will cause them to start violently. These women cannot get used to the "popping" of ordinary Bunsen burners, and I believe this feature of the ordinary gas stove has retarded the magnitude of our sales more than any of us appreciate. Gas stoves should be so constructed that the burners will not pop when turned out, and they should also be constructed to prevent the oven door from flying open and cutting the operator's face, in case of an explosion due to burners being turned on for some time prior to lighting them. If it is desired that some vent be provided to prevent wrecking the stove in case of an explosion, place this vent on the side or back, where it is not likely to strike the operator if it is forced open.

These oven explosions are generally caused by turning the stove off with the stopcock on the supply pipe, rather than with the individual valves, as should be done. When the stove is again used the main stopcock is turned on and the gas flows freely to the oven, often causing an explosion. The easiest and best way to prevent these accidents is to put no stopcock on the supply pipe, and thus compel the operator to use the individual valves.

Reason No. 7.—(Dislike to Abandon the Use of a Good Coal, Wood or Gasoline Stove.)—Considering expense and results, it hardly seems desirable to change gasoline stoves over for the use of gas. Where the possession of a good coal, wood or gasoline stove prevents the sale of a gas stove, it would seem the most effective way to simply make a trade of a gas stove for the prospective customer's stove.

Reason No. 8.—(Our Present Inability to Provide Consumers with Hot Water for Bathing and other Purposes at a Moderate Cost, and in a Satisfactory Manner.)—The hot water question is not solved by any means. Most of the pressure heaters now on the market are crude, clumsy and ineffective. Every gas company should provide means to test water heaters, and should never be satisfied with a heater until it yields an efficiency of 75 per cent. In other words, if the heater does not put 75 per cent. of the heating value of the gas into the water, it is inefficient. Another reason why gas companies should test heaters is for the purpose of determining what rate of consumption is the most effective on their particular gas. The rate of consumption will cause the heater to vary in efficiency from minimum to maximum, represented often by 0 per cent. to 60 per cent. It will generally be found that heaters increase in efficiency as you increase the rate of gas consumption, and consumers should be made to understand that the most economical results will be obtained by the use of a full head of gas. The ordinary heater in ordinary use will probably not have an efficiency much above 35 per cent. Heaters should be so constructed that solid matter will precipitate below the burner, and they should be connected as close to the kitchen boiler as possible, using the shortest length of connection pipe and the fewest bends possible. There is little or no advantage in the water heater being made a portion of the range, and many disadvantages. The independent heaters will generally be found the most effective and advantageous.

I might say much more on pressure water heaters if space would permit, but as the solution of this problem is exactly in line of steam boiler practice, I will simply recommend that the manufacturing companies provide their designer with some good, scientific treatise on steam boiler practice, or get a good, scientific steam engineer to design a heater for them.

Instantaneous water heaters are generally far more efficient than pressure water heaters, but there are many objections to their use.

First. They are high in first cost.

Second. They are more troublesome and complicated to operate.

Third. The bathroom for six months in the year is overheated and under-ventilated, and the instantaneous water heater proves undesirable by increasing this disagreeable condition.

Fourth. They demand a large flow of gas which often affects the satisfactory working of Welsbach lights and other gas appliances fed from the same service.

Fifth. They are more frequently out of order than any other gas fuel appliance.

Sixth. They provide hot water only at the point where they are located.

There is one heater which I have not touched upon. It is an instantaneous water heater under pressure. While it has some of the bad points of each heater, it has practically all of the good points of either. The water passes through a long coil of brass tubing located directly above several large Bunsen burners. The gas is automatically turned on

whenever water is drawn from any faucet on the hot water system, and gas is lighted by a small pilot jet, which is constantly burning. While the tubing is but about ¼-inch in diameter, there is no tendency for it to clog, as the water will not rapidly precipitate its mineral matter except when heated, and as the water in this heater is flowing rapidly through the coil as long as it is subjected to the heat of the burners, the mineral matter is given no opportunity to precipitate.

Much better results can be obtained in heating water, no matter what kind of a heater is used, if a supplementary water storage tank is provided, as explained in Mr. Clark's Wrinkle, furnished for the 1897 meeting of Western Gas Association. Another marked economy may be practiced by reducing the loss by radiation from the kitchen boiler and piping, by shortening the conduction pipes as much as possible, and covering both the boiler and piping with heat insulating material.

Reason No. 9.—(The Difficulty of Disposing of Garbage.)—The users of gas stoves have no way to burn up their garbage, and unless they are provided with means for its disposal it is a drawback to the use of gas for cooking. After calling attention to this matter little else can be said. Local conditions will determine the probable course to pursue to care for this objection. One manager of a gas plant has determined to operate a garbage system for his customers, if he cannot induce the city to do it for everyone.

Discussion of reasons why I assume gas is not used for the entire year, viz. :

(*a.*) The failure of our consumers to see any advantage in the use of gas, except during the heated season.

(*b.*) No provision for heating kitchen except by cook stove.

(*c.*) The greater relative economy in use of coal or wood at times when heat must be provided for the kitchen.

The use of gas continuously for 12 months in the year is certainly desirable. The 12 months' stove will use more than twice as much gas as the summer stove. Consumers are not apt to use their stoves, except in the summer, unless they are provided with satisfactory means of heating their kitchen and water for baths, etc., and they are not generally apt to provide means to heat their kitchen and bath water without an earnest effort on our part. Where possible, the extension of the existing house heating system so it will embrace the kitchen, will overcome the greatest objection to the use of gas during the winter. If the houses are heated with steam or hot water, the bath water can be easily heated by inserting a coil in the kitchen boiler, or by putting in a kitchen boiler with an interior heating coil, which is obtainable from any plumber's supply house.

If hot air is used, a coil can be put in the furnace and the hot water obtained in this manner, and if the hot air pipes cannot be extended to the kitchen, it is also possible to heat the kitchen in this manner. It would seem a good policy for the gas companies to keep track of all the new buildings, by making regular visits to the architects' offices, and it would probably pay to give the architects a premium for every house which is built or remodeled, and means provided for heating the kitchen. There are many ways to induce customers to extend their heating systems so as to embrace the kitchen. In the small cities it would probably be necessary for the gas company to take this up direct with the consumers, but in the larger cities it will probably prove more effective to merely pay a moderate premium to architects, furnace men and steam fitters for all houses where they provide to heat kitchens from regular house heating system. In Madison, Wis., we attempted to keep our stoves in use during the winter months by inducing consumers to purchase small heating stoves for use in the kitchen. While we gained some consumption by this plan, it could hardly be pronounced a success. The cost of the fuel necessary to heat the kitchen is too noticeable, and the cook still has the annoyance of attending to a coal stove.

To sum up, I believe the most important factors in ultimately obtaining the largest output of gas for culinary purposes, are, in the order of their importance, viz.: First, making every gas stove now in use yield satisfactory results to users; second, active and intelligent solicitation to introduce stoves in homes where not used; third, persistent and intelligent advertising.

In regard to advertising and soliciting, while any effort in this line will probably prove productive, yet I believe there is only one right way to solicit and advertise. As the two methods are both intended to accomplish the same purpose, they are both subject to the same general arguments. Soliciting and demonstrating in a general classification would be considered as a form of advertising.

Considering advertising in its strict sense, the following rules might be laid down.

Advertise incessantly in every conceivable way that seems to promise a good return on the outlay. Newspaper advertising is probably the best, and it offers an excellent means for valuing the worth of other forms of advertising. I have often used the following formula to determine the worth of other mediums of advertising compared with cost for newspaper advertising :

Number of issues × circulation × number of readers of each paper × number of units of space = the number of opportunities, and by dividing cost per number of opportunities you have the cost per opportunity. You must then judge the comparative worth against the comparative cost of each opportunity, considering among many other factors the following, viz : The standing imparted by the medium, the desirability of class of people amongst which it circulates, and the likelihood of its being read. To reach the general classes, you will generally find that newspaper advertising is by far the most reliable and cheapest, and for many reasons the most desirable. Advertising by circulars and handbills is of doubtful value. There is nothing that will so quickly and thoroughly offend some people as to find a handbill thrown on their lawn, front doorsteps, or public hall ; and it is not to be wondered at. Advertising by mail, either circulars or personal letters, reaches directly the people you are after, but too much of it will prove offensive. Newspaper advertising does not offend. It is quick and reliable, and produces a friendly feeling between the newspaper and the company that alone is often worth more than it costs. Writing the advertising matter is not an easy task. The advertising agent for any other business can talk about some other commodity every day. The drygoods man, for instance, can talk towels, handkerchiefs, dress goods and a hundred other things. You must talk the same thing every day—365 days in the year. Your "ads." must be fresh and bright or they will not be read, and they must not be flippant, or they will fail to create the desired effect.

In a city under fair conditions, where advertising is properly done, both in quantity and quality, the opportunities will probably support one solicitor for every 5,000 inhabitants. To intelligently direct their efforts you must divide the city into districts, ascertain the number of houses, who occupies them, who owns them, and much other information. You then know the total number of possibilities, and can judge the comparative merits of your solicitors. A poor solicitor often does more harm than good—a good solicitor is beyond description. He can sell stoves where you could not give them away, even if you furnished free gas. He can overcome apparently insurmountable obstacles. He can acquire the friendship of numerous people and command their influence and assistance. You thus have many agents while you pay the salary of but one. Your solicitors give you an excellent avenue through which to feel the public's pulse.

Demonstrations in cooking in the ordinary manner are effective as far as they reach, but you can give free demonstrations for a year, and a careful investigation will reveal the fact that the attendance has been limited to a very small fraction of the people you wish to reach. If you want to reach a large portion, you will probably find it necessary to borrow your consumers' kitchens, and have your solicitor get the neighboring women to come in and witness the demonstration. You will probably find this by far the most effective method, as you have but a few in attendance. They are the very ones you want, and your solicitor and demonstrator have an excellent opportunity for individual work.

I have taken some pains to treat this subject in a manner applicable to cities of all sizes, and to prevent offending anyone feeling inclined to pompously toss my paper aside as being applicable to villages only, I wish to have my position definitely understood by stating my belief. We must make our work more individual in character, as general work is less effective. A large city is capable of being divided into whatever sized communities can be most advantageously treated, and work lacking thoroughness cannot much longer be excused on account of the size of the city.

[To be Continued.]

Railroad Car Lighting.

By Mr. R. M. Dixon, M. E., in "The Stevens Indicator."

The subject of railroad car lighting has received a great amount of attention by all interested in artificial lighting, and as a result, the Pintsch System is the one accepted practical method of lighting steam railroad cars for the world, in spite of the fact that electricians have devoted their energy towards securing a satisfactory adaptation of electric lighting for passenger cars.

There are at present eight different electric methods, all more or less in use, and energetically urged upon railroad managers, but notwith-

standing all this, there are not more than 175 or 200 cars in the United States lighted by electricity (this of course does not include trolley cars) while there are about 12,700 cars lighted by gas, and this number comprises a large proportion of all the best railroad passenger equipment.

The use of oil is expensive, dirty and general unsatisfactory. No oil lamps have yet been devised which do not easily smoke, or become extinguished by such draughts as are frequently present in a passenger car. Railroad managers generally are desirous of securing some more improved light for better service, and for removing the liability of fire in case of accident or carelessness.

Of the electric lighting systems, four different companies propose to light cars by dynamos driven by power obtained from the axle, using storage batteries charged by the dynamos as a reserve source of illumination when the speed of the train is too low for the dynamo to generate the desired current for lighting. Three systems maintain dynamos either in the baggage car of the train, or carried on a special car and driven by steam from the locomotive or from a special boiler carried in the car, while one system depends entirely upon storage batteries. In all of the electric systems it is necessary to use storage batteries which require inspection, for which railroad storage yards at terminals are poorly arranged, and because of the value of real estate near large cities, cannot be re-arranged except at large expense. All electric lighting systems are expensive to maintain. Even with the axle driven devices it is hardly necessary in order to show the high cost, to discount the statement made by promoters—that no power is required—for they say "the wheels turn, the dynamo is driven by their rotation."

The three gas lighting systems referred to are the air gas, compressed city gas, and oil gas known as Pintsch gas. There are about 900 cars fitted with the air gas system which embodies vessels filled with cotton wick saturated with gasoline, through which air from the air brake system of the train is passed and which becomes charged with the vapors of gasoline forming a carbureted air gas.

Compressed city gas has been used for car lighting on perhaps 1,500 cars. It is used now upon possibly 800 cars, but the very low candle power of city gas after the losses which are sustained during compression, requires not only the carrying of high pressures but of a very large number of tanks, and frequent charging stations in order to supply the needs of American railway service.

The Pintsch compressed gas system is the most generally satisfactory illuminant for the various conditions of railroad operation that there is to-day. It is now in use on 11,000 cars in America and about 74,000 cars in other countries, making a total of 85,000 cars, about 2½ times as many as the total passenger equipment of the United States. The system requires special supply stations. These are located at the railroad termini, usually in large cities where a single plant can supply many customers. The installation consists of an oil gas manufacturing plant, combined with compressing and storage apparatus, with supply pipes leading from the plant to various railroad yards and stations with valves there for hose connections. The gas is made entirely from oil, and in the amount of oil used per thousand and the method of treatment is found the great difference between Pintsch and city gas for car lighting, and the value of the former.

It is unusual to supply city gas of more than 20-candle power based on a consumption at the rate of 5 cubic feet per hour. A few gas companies supply gas which exceeds that value, but an average for the cities of the United States would not exceed 17 or 18-candle power. Pintsch gas is 65-candle power. On subjecting city and Pintsch gas to compression, for purposes of transportation, some of their illuminants are lost, being precipitated as liquid hydrocarbon. About an equal amount in both cases is thus removed reducing city gas to 9 or 10-candle power, and Pintsch gas to anywhere from 50 to 60-candle power. It is, therefore, safely claimed that for a given illumination, from 4 to 6 times as much city gas would be required as Pintsch gas.

A properly lighted passenger car is one in which each one of the 60 to 70 passengers can read ordinary print comfortably, and further than this, the car itself must be so generally illuminated as to produce an effect of being well lighted. Oil lamps have been frequently noticed to fulfil the latter condition, at the same time being notably deficient in supplying a sufficient light for reading. On the other hand, lamps so arranged as to distribute the light all below a horizontal plane passing through the lamps, will give a sufficient light for reading, but the effect of the car illumination will be unsatisfactory. It is necessary to have lamps which will radiate some light in all directions.

In a passenger car not much latitude is allowed for variation in the location of the lights. The construction of the car interior and the necessity for having simple gas connections to the lamps make it necessary to have the maximum illumination proceed from lamps suspended from the ceiling, and from lamps so suspended the maximum amount of light should be radiated in a direction of about 30 to 45 degrees below the horizontal to give the greatest efficiency. Shadowless lamps which give the maximum radiation of light at this angle will give a practically even illumination throughout the car in which the lamps are spaced from 6 to 10 feet apart.

The Pintsch system is also applied to the lighting of buoys for coast and channel marks. The buoys in their construction comprise a hollow vessel having sufficient buoyancy to float and these carry, mounted on a tower, a storm proof lantern in which the consumption of gas varies from ½ to 1 cubic foot per hour. The main shell or body of the buoy is the reservoir for compressed gas, and the lights burn, without the reservoir being re-supplied, from 100 to 200 days. In some cases, lights are supplied with flashing mechanism which reduces the monthly consumption of gas and adds about 75 per cent. to the period of lighting without re-charging.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, October 10, 1898.

"Newbigging's Handbook."—Down a Coal Mine.—The Gas Stove and the Dust Bin.—Scientific Jeremiahs.

I was rather amused, in glancing over a popular magazine a few days ago, to find a paragraph to the effect that gas was so far a thing of the past, that the fact of the present year being the centenary of gas lighting had been almost overlooked. These innocent looking paragraphs, all playing to the tune of "Electricity everywhere—gas nowhere," turn up in most unexpected places, leading one to suppose that electricians have taken up the patent medicine style of advertising. Gas has made its way without tricks of this kind, and the author of the above named "par." would have done well for the credit of his publication to have inquired into the facts before undertaking to enlighten (!) the public about gas. And he might specially have referred, with advantage to his character for veracity, to the introduction to the new edition of the work named in the headlines, the concluding paragraph of which sums up the matter in a few words, which are worth quoting both on account of their own value and also as a specimen of the style of information to be found in the 6th (and centenary) edition of this well known book. They are as follows: "The tangible result of it all is that gas property has attained to a reputation for value and stability scarcely exceeded by any other means of investment outside the Funds, and competition notwithstanding, there is ground for confidence that it will continue to maintain its deserved popularity." Mr Newbigging is the best authority, and such sound information should be widely circulated for the benefit of the nervous ones, usually spinsters, widows or elderly persons, who can least afford to lose money, and who take fright at ill judged irresponsible paragraphs in popular periodicals, accept them as emanating from an anonymous Solomon, and are thus led to part with their property for less than current value.

The great difference between Newbigging's Handbook and the majority of other handbooks lies in the fact that the author is and has been for many years engaged in the work of which he is such an able exponent, and has gathered nearly all the information in the course of everyday experience, whereas many of the text books put forward are mere paste and scissor compilations, possibly prepared by a literary expert, but by an author who, nevertheless, lacks special technical knowledge of his subject. The result is that the student is told a great deal that is already known, and a great deal that is not needed to be known at all. Mr. Newbigging, on the other hand, both knows what is wanted and has special facilities for supplying that want. The alterations that have been introduced into the new edition, which are so numerous as to involve almost entire rewriting, furnish conspicuous evidence on this point. The engravers' art has also been invoked to a larger extent than formerly, as there are now no less than 239 illustrations, while the printing and bookbinding simply leave nothing to be desired. Ladies, as a rule, have their own notions on bookbinding (as on most other subjects), and some who have seen the work declare that the style is much too good *for* a "gas book," but those of your readers who are wise enough to obtain a copy will think that the contents are well deserving of neat and elegant surroundings.

Several hours out of one of the days of my summer vacation were spent in a locality about 700 yards below ground level. I have long promised myself, not just a hasty peep, but a careful study of the conditions under which coal is found and worked, and under the care of a thoroughly competent guide was able to carry out this intention, and to

learn more about coal and coal mining within the space of two hours than has been gleaned by the careful perusal of hundreds of printed pages treating on the subject. It is one thing to read about a miner lying on his side in a 2 foot seam, while comfortably ensconced in a study armchair, and another to don a suit of rough flannels, discard all the ordinary refinements in the way of linen, and go down and do a few minutes' work at his side. The colliery which I was kindly allowed to visit was perfect of its kind, lit with electric glow lamps, and thoroughly ventilated. Indeed, I have found the atmosphere in many drawing rooms much more "stuffy" than that in the 2-foot seam. Apart from the mine, the machinery above ground is interesting. There are ponderous pumps, lifting water from a sump in the deepest part of the excavations, winding engines for raising and lowering the cages, and powerful compressing machinery for driving air down the shafts and into all parts of the workings. Compressed air is used for working hauling engines in the mine itself, besides being supplied for ventilating. There are several inclined planes at an angle of about 30°, up which rows of small trucks are drawn by means of steel ropes. On the levels, the trucks are drawn by horses, who have stables and are permanent residents underground, and appear quite as well and comfortable as their relatives on ground level. I secured a good selection of specimens for my geological cabinet, and would strongly advise all who are interested in industrial engineering to take the earliest opportunity of going down and seeing for themselves how the coal is won.

The surveyor of a large district in London, who amongst other duties has to be responsible for the removal of over 27,000 tons of dustbin refuse in a year, has reported that the character of the contents of the domestic dustbin is undergoing a change, attributable to a large extent to the general adoption of the gas stove. During the summer months the bin receives every description of refuse except ashes; paper, cardboard boxes and vegetable cuttings being most in evidence. In the days of the coal fire a large proportion of this was burnt. With the gas stove it cannot be so dealt with, and it is no uncommon experience, particularly in a high-class district, for the men to load up without getting a particle of dust in the cart. This means an increase in that which is useless, and a decrease in that which has a money value. This statement, coming from an independent authority, is worthy the careful attention of all householders.

Many local authorities are now going in for refuse destructors, and therefore desire to secure refuse that contains a large proportion of combustible cinders. But the point that the householder has to consider is that these ashes, which the local authority are good enough to take away without charge, did not come to him in like manner, but in the form of coal for which he had to pay at current rates.

The fact that the gas stove leaves no refuse for the dustman to remove is a testimonial in its favor, as showing that there is no waste. Out of a ton of coal, perhaps 3 or 4 cwt. are thrown away and removed as ashes. But 1,000 cubic feet of gas can be consumed so as to yield full 20 cwt. to the ton value. The gas stove, moreover, can be lighted a minute before it is wanted and extinguished immediately afterwards, while the coal fire takes time and trouble to get into working condition, and when done with, there is a mass of fuel that continues to burn for hours. These and other advantages have secured the adoption of the gas cooking stove, and many other district surveyors besides the one in point, will find a lack of "money value" in the dust bin refuse, which by the way, is somewhat wrongly named if it is really worth anything.

Gas engineers are so fully occupied with the exigencies of the present and of the immediate future that they have no time or sympathy to spare for those vague speculations relating to more distant periods, which appear to be the fashion in scientific circles just now. We sometimes laugh at the electricians, who are wont to account for the failures of the present, by attempting to excite a feeling of faith in the possibilities of the future. Hope, we are told by the poet, springs eternal in the human breast, and if the electricians can enliven the events of the present day with glorious dreams of the future, who can blame them? The hard-headed gas man, accustomed to stand before his shareholders with a balance of cash in hand sufficient to pay full dividends, may remark that dreams do not count for anything in the profit and loss account. But at least the electricians may take credit for adopting cheerful views, which are quite an exception to the usual scientific practice. The President of the Royal Society, for example, has discovered that the wheat growing capabilities of the earth will be exhausted about the year 1931, and according to another authority we may expect coal to go up to famine prices soon afterwards. In fact he seriously advises all concerns having capital invested in industries which depend upon coal, to commence without delay to set the house in order, and to prepare for extermination within the next half century. Soon after that, according to another authority, oxygen will begin to get scarce. It is right to add that, having pointed out the disease, most of these Jeremiahs are prepared with a remedy. But one may be forgiven for asking if they could not leave 1950 and 2000 A.D. to take care of themselves, and come back to the numerous needs of 1898. Otherwise we shall soon have some caricaturist prophesying about a time when Royal Societies and learned Professors will have become used out, like the wheat and the coal and the oxygen. Prophets of the future are all very well, but give me the workers of the present. Welsbach with his incandescent burner, and Perkin with his coal tar dyes, can point to some real tangible benefit secured by means of their labors for their fellow-men. These are the models for men of scientific ability to follow rather than those who tell us what will happen when neither they nor we will be here to see.

Electrolysis of Water Mains, Dayton, Ohio.

The *Engineering Record* reports the receipt, some time ago, from Mr. Charles E. Rowe, Secretary of the Dayton, Ohio, water works, of a pamphlet containing a number of reports on the injury done to the water mains in that city by wandering electric railway and lighting currents. There are five entirely independent reports, which together form one of the most thorough statements on this subject that has been issued by any city. Electrolysis was discussed at length several years ago by this paper, and since then its columns have contained a number of important articles on the topic, so it is hardly necessary to refer now to the general features of the subject. The situation in Dayton, however, is rather unusual, and merits particular attention for that reason. When it was discovered that the pipes were being destroyed by wandering currents, Mr. Harold P. Brown of New York was retained to make examinations of the electrical conditions so far as the city's pipes were concerned. He made tests of the difference in voltage between the wires, rails and pipes, and plotted these results on a map in a manner which is familiar to all who have gone into the subject. Wherever the pipes were positive to the rails, that is to say, wherever there was a tendency for any electric current they carried to leave them, there was danger of their corrosion, for pipes and other conductors are corroded where the current leaves and not where it enters them.

The destruction in Dayton is unlike that in most cities, although possibly Peoria presents similar conditions. As a rule, electrolysis produces an oxide of iron, a poor conductor of electricity, so that at a given voltage, the deeper the layer of oxide the lower the rate of corrosion. In Dayton, however, pipes become covered with a black material like graphite, while the pebbles and stones near by seem to be plated, as it were, with the iron which has been taken from its original position.

The protective covering on the water pipes seems to have no effect in preventing electrolysis. Mr. Brown reports that three volts or less difference in pressure between the pipe and rail generally results in a coating of not more than a thirty-second of an inch of graphitic substance, below which the pipe seems to be uninjured. Where the voltage is higher the injury is much greater. An examination of pipes, some of them 20 years old, laid in Dayton in situations where there is no electric current to affect them, shows that the soil has no effect whatever on the metal, and the corrosion which has been observed must therefore be attributed to the currents from the electric railway service.

It is not at all remarkable that this condition of affairs exists, because the unusual conductivity of the soil naturally induced the railway companies to use a very small amount of return wire. Moreover, the city is divided electrically by rivers and canals, and the metal conductors of the railway companies over the various bridges are utterly inadequate to return the currents to the stations, so that most must return by way of 12 pipes for gas and water. To show how little of the return current passes through the rails, measurements were taken at one point, and it was found that nineteen-twentieths of the whole current passed through the pipes in the vicinity, and but one-twentieth through the rails.

Mr. E. E. Brownell, the Electrician of the Water Works Trustees, also made examinations of the condition of the pipes, and found they were in a hazardous state. Moreover, he discovered, what has been pointed out before, that it is impossible to fix a certain voltage as the limit below which current will be of little account. A 6 inch main he found to be corroded to a depth of a quarter of an inch, although, as a rule, it was not more than 1½ to 2 volts higher than the rails in the vicinity.

In several cases the pipes were found to be so badly injured as to be useless in case a heavy fire pressure came upon them, and a number of physical tests were made to discover if apparently sound pipes subjected to electrolysis were materially weakened. It was found that the iron in such pipes had only about six-tenths the strength of iron in similar pipes which had not been injured by these currents.

Mr. Rowe reports that about 46,000 feet of pipes from 4 to 16 inches in diameter have probably been affected more or less by electrolytic action, and this injury has taken place in the most important portion of the city. In the danger district there are 110 large service pipes to hydraulic elevators, special fire protection systems and power houses, and 1,419 smaller services, all of which have probably suffered by the same destructive action. Most of this pipe is laid in paved streets and over 2 miles under car tracks, where it can be reached with great difficulty. It is estimated that at least $77,000 must be spent to replace the pipes in this district, and their present condition is shown by the fact that while they withstood a hydrostatic pressure of more than 300 pounds per square inch when new, they have been found leaking at 150 pounds pressure now. Judging from the results of the examinations, Mr. Rowe believes that a 6-inch pipe laid in the danger district of Dayton will become useless in five years.

No statement is made in the pamphlet as to any remedy for the existing condition of affairs as outlined in any of the reports. The Board of Trustees has been placed in possession of the results of the examinations, and they are left to devise some remedy. What that will be, or whether they will pay any attention at all to the subject until their pumping machinery is broken by the unexpected bursting of some large main, or the pipe distribution system becomes so full of holes that water pumped into it will disappear as out of a sieve, it is, of course, impossible to say. But it is of some interest to notice in another recent report, presented to the Engineer Commissioner of the District of Columbia by Mr. Walter C. Allen, that remedies have been adopted in Washington, where a condition of affairs almost as serious as in Dayton seemed imminent. There the covering of the telephone company's cables was very seriously affected by return currents from the railway and lighting service, and the plan followed by Mr. Farnham a number of years ago in Boston and elsewhere was at once adopted with good results. Heavy copper wires were strung along the cables where electrolysis was feared, and connected with their coverings. These heavy wires were connected in turn to a good conductor leading to the power station, and in this way the currents which would otherwise work serious damage were led back to the dynamos without causing much injury.

Dalton's Law.

By Mr. W. N. Shaw, F.R.S., before the British Association.

Discrepancies between the sum of the partial pressures of air or nitrogen and saturated vapor and the pressure of mixtures of the gases respectively with saturated vapor, indicating *prima facie* a departure from Dalton's law, were shown by Regnault (*Ann. de Chim.*, [3], Vol. xv.) to exist for water vapor; the extent of the difference being on the average nearly half a millimeter.

Regnault himself, in his classical paper on the Pressure of Vapors (*Mem. de l'Institut*, Vol. xxvi.) sought to throw additional light on these discrepancies by examining the increase of pressure produced by adding ether or some other volatile liquid to an atmosphere, the pressure of which had been previously measured. In the course of these experiments, he concluded that he had satisfactorily ascertained the cause of the phenomena to be the condensation of the vapor on the vertical sides of the containing tube under a pressure of vapor less than the saturation pressure corresponding to the temperature. He regarded Dalton's law as being true, in fact, for a gas-filled space completely surrounded by a sufficiently thick layer of the evaporating liquid. In a vessel with solid vertical walls gravity prevents the formation of a layer of the required thickness on the vertical sides. This hypothesis was held to account for the fact that, if the mixture were compressed as in a Boyle's law tube, the pressure gradually diminished after the initial compression to a value less than that required by Dalton's law; in the case of ether about 10 m.m. of pressure were missing on this account.

Such a hypothesis would give a satisfactory explanation of the phenomena if the sides of the glass vessel were gradually dissolved away by the liquid condensing, as, for example, would be the case if the tube were made of rock salt, but if the action between the glass sides and the vapor were merely a mechanical one, the supposed continuous evaporation of liquid from the horizontal surface and its return to the stock by condensation on the vertical sides, and running down these, would seem to contradict the principle of conservation of energy.

Regnault's explanation is the more difficult to accept if the density of the vapor be considered. Prof. J. J. Thomson, in his "Application of Dynamics to Physics and Chemistry," has shown that the addition of air pressure upon a liquid surface in contact with its saturated vapor ought to result in a slight additional evaporation, causing a slightly increased density of vapor, and the experiments of the author upon air at various degrees of saturation (*Phil. Trans.*, 1888) indicated some slight increase of density beyond that required to correspond with the vacuum pressure, so that any departure from Dalton's law could not be attributed to the want of mass of vapor in the saturated air.

The point might be investigated by examining closely the behavior of a mixture of air and vapor under isothermal conditions in the neighborhood of the point at which condensation begins to occur. At great rarefaction the mixture would behave as a perfect gas, and if the isothermal relation between p and $1/v$ were plotted on a diagram (with a suitable correction if necessary for the deviation of the air from Boyle's law) the curve obtained would be a straight line through the origin represented by $p = k \times 1/v$. At great concentration, if Dalton's law were strictly true, the relation would again be represented by a straight line, viz., $p = k'\ 1/v + p_v$; where k' is the Boyle's law constant for the contained dry air, and p_v is the saturation pressure of the vapor.

This line would cut the vertical line $1/v = 0$ in the point distant p_v (*i. e.*, the theoretical saturation pressure) from the origin, and it would cut the line $p = 0$ in the point $1/v = -\frac{p_v}{k'}$. These two theoretical lines would meet if produced at an obtuse angle in the theoretical saturation point.

If, on the other hand, at the greater concentrations there were a discrepancy from Dalton's law proportional to the total pressure and therefore represented by the relations $p = k \times 1/v + p_v - \lambda p$, the observations would still show a straight line not quite coinciding in direction with the theoretical line for Dalton's law, but cutting that line in the point on the horizontal axis $(-p_v / k', 0)$, and cutting the vertical axis at a point distant $p_v / (1 + \lambda)$ from the origin. Various other hypothetical laws of variation might also be suggested.

A series of observations thus plotted would enable one to determine whether the actual behavior tended to approach agreement with Dalton's law, or some recognizable modification of it, such as that suggested.

Regnault's observations, recorded in the paper referred to, include a series of determinations of the pressure and related volumes of mixtures of air and ether vapor for the temperature of 7.7° C. They also show the dry air pressures for the series of observed volumes, so that the pressure of this mixture can be plotted against the pressure of dry air for the same volume, and the correction for any deviation from Boyle's law for dry air is thereby made automatically. A diagram showing two sets of his observations was exhibited. The pressures ranged between 600 and 1,400 m.m. It was pointed out that, for the observations at greater rarefactions, the theoretical line was very strictly adhered to until the pressure reached 80 per cent. of saturation, then slight discrepancy in the direction of loss of pressure was indicated, increasing until it amounted to more than 10 m.m. for the theoretical saturation point; beyond that the discrepancy showed a slightly diminishing value. A straight line drawn to show a theoretical defect from Dalton's law amounting to λp (where $\lambda = 0.007$) agreed much more satisfactorily with the plotted observations.

The second series of observations, made with a greater amount of ether, showed the discrepancy from Dalton's gradually vanishing with increasing pressure.

It was also pointed out that in drawing his conclusions Regnault had not taken account of the supersaturation of air which would result from compressing air at constant temperature in the absence of nuclei for condensation, and the time that would be required under these circumstances for the gradual deposition of the excess of moisture upon the liquid surface exposed to it.

Moreover, it seems most unlikely that if the presence of air caused a discrepancy of 10 m.m. for a total pressure of 1,000 m.m., the increase of the air pressure to 1,400 m.m. should do away with the discrepancy previously caused. In other words, the line connecting the observations and intersecting the theoretical Dalton's law line at the highest pressure recorded is antecedentally improbable and unreal.

It may therefore be concluded that Regnault's explanation is probably an unreal one, and that an actual divergence from Dalton's law is indicated. The amount of the divergence, however, cannot be finally deduced from the record of Regnault's observations, and must await a repetition of those or similar experiments in which the errors which may be due to supersaturation are guarded against.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

We understand that Messrs. D. B. Lyons and D. C. Brainard, of Des Moines, Ia., have made a proposition for the purchase of the Ottumwa (Ia.) Gas Company. The property is rather heavily burdened.

A correspondent, writing under date of the 21st inst., says: "Please correct item in your issue for the 17th inst., stating that Mr. Wm. Luebkeman and Mr. Chris. Luebkeman have secured a 'controlling interest' in the Eau Claire (Wis.) Gas Light Company. They have purchased Mr. W. H. Watson's stock, and Mr. Chris. Luebkeman has been promoted to the Secretary-Treasurership of the Company, but the controlling interest remains as before."

The Commission appointed by the Supreme Court of Massachusetts to determine the price that the authorities of Holyoke (Mass.) shall pay for the gas and electric light properties of the Holyoke Water Power Company—it is proposed to eventually operate these on public account—met some days ago. The session was held in the aldermanic chamber, and, beyond organizing and deciding to begin the hearing in Springfield, Mass., the morning of November 21st, nothing much was done. The Commission is composed of Judge E. C. Bumpus (Chairman) and James E. Cotton and E. K. Turner.

The business of the Oshkosh (Wis.) Gas Light Company steadily increases under the capable management of Mr. William Mainland. It

is proposed to make considerable addition to the Company's main system next year.

AN explosion in the engine room of the works of the Fresno (Cal.) Gas and Electric Light Company luckily resulted in slight damage. The explosion (it occurred on the 14th inst.) was all the more dangerous, in that the heat created by it set fire to the petroleum storage tank (for it is with petroleum fuel that the Company's boilers are fired.) The quick response and good work of the firemen, abetted by the efforts of the Company's men, quelled the flames before damage amounting to $300 had occurred.

AT a recent meeting of the Directors of the Union Light and Power Company, of Salt Lake City, Utah, it was resolved to put the net rates at $1.75 per 1,000 cubic feet on illuminating account and $1.25 per 1,000 on fuel account, the net rates to obtain only when bills are paid before the 8th of the month succeeding the presentation of the bill. Failing such payment the Company may add 15 cents per 1,000, either on a fuel or illuminating use. These terms go into effect to morrow. The correspondent who forwards this information adds: "The action was taken by the Company on the ground that natural gas was not being received by it, and that it could not longer supply the manufactured product at natural gas rates. If the gas wells should again supply a sufficient quantity to meet the demand, the Company may modify its schedule, but it will not do so until assured that the flow from the fields will be adequate and continuous. The Company has made arrangements with the Western Gas Construction Company, of Fort Wayne, Ind., for the installing of an improved water gas plant, which it is hoped will be set up and in operation by December 15."

WE regret to report the death of Mr. James C. Swan, who had been for long an influential member of the Board of Directors of the Newport (R. I.) Gas Light Company. Mr. Swan was also the principal shareholder in the New England Commercial Bank, and had been President of the Newport Savings Bank since 1888, prior to which year he had served it as Vice-President, from 1879. He was in his 87th year, and was much respected by the people of the city in which his long and honorable life was passed.

AT the annual meeting of the Troy (N. Y.) Gas Company the Directors chosen were: A. Bleecker Banks, A. E. Bonesteel, A. N. Brady, Thomas Breslin, Fred. E. Draper, James Fleming, S. O. Gleason, George P. Ide, Wm. Kemp, F. J. Molloy, Edward Murphy, Jr., R. C. Pruyn and W. A. Thompson.

THE dividend rate of the Grand Rapids (Mich.) Gas Light Company has been increased to 6 from 5 per cent. per annum.

THE employees of the Columbus (O.) Gas Company enjoyed themselves thoroughly on the occasion of their last semi-annual reunion, which was brought off in their well-appointed hall, corner of Loring and Front streets, on the evening of the 20th inst.

THE Paterson (N. J.) *News*, of recent date, had this to say: "The United Gas Improvement Company has purchased the entire interest of the Paterson Gas Light Company and of the Peoples Gas Company, the works of which Companies it has leased for the past 20 years. The public will be pleased to know that no change in the local management will be made in consequence of the change in ownership. Mr. W. H. Williams, the present Superintennent, has held this position for an extended period, and his work has always given the utmost satisfaction to the patrons of the Company and to the stockholders. Manager Rogers came to this city in 1888 to assume the management of the Company, and since his advent here the patrons of the Company have had no reason to regret it."

AT the annual meeting of the Denver (Col.) Consolidated Gas Company the officers chosen were: J. B. Grant, George Coppell, Dennis Sullivan, Grant B. Schley, J. A. Thatcher, Joel F. Vaile, H. F. May, H. M. Porter and C. A. Chisholm; President, J. B. Grant; Vice-President, G. Coppell; Secretary and Treasurer, F. W. Herbert; Asst. Sec., Joseph Dale; General Manager, A. H. Branch.

SECRETARY KRUMHOLZ has notified the shareholders of the Buffalo City (N. Y.) Gas Company that the annual meeting of the Company will be held in Buffalo, Nov. 7th.

IT is reported that E. R. Davis and others have applied for a franchise to operate a gas works in Manitowoc, Wis. This place is the capital of a similarly named county of Wisconsin, and is located on the west shore of Lake Michigan, at the mouth of Manitowoc river, at a point 77 miles north of Milwaukee and 65 miles west of Lincoln, Mich. The Milwaukee, Lake Shore and Western Railroad passes through it. It sustains important shipbuilding interests, and exports of wheat, lumber and leather are prominent features of its trading. Its population is not far from 10,000.

THE City Council, of Pontiac, Ills., has granted a franchise to Dr. Joel Allen and others for the operation of a gas works in Pontiac. The franchise is to last for 20 years, and under its terms the price of gas, during the first 10 years, to the ordinary consumer, is not to exceed $1.50 per 1,000 cubic feet, and thereafter the price shall not exceed $1.25 per 1,000. Gas is to be furnished for city use at the rate of 90 cents per 1,000. It is stipulated that the gas plant must be located at least 1 mile away from the Court House, that construction work on the plant must be commenced within 1 year and be completed within 2 years from the acceptance of the franchise, and that the gas shall be of "standard" quality.

PONTIAC is the capital of Livingston County, Ills., and is located on Vermilion river, at a point 93 miles southwest of Chicago and 33 miles northeast of Bloomington. It is reached by the Chicago and Alton and the Chicago and Paducah Railroads. The Illinois State Reform School is within its boundaries. Its population is not less than 5,500.

MR. H. M. BIGELOW, the wideawake Treasurer of the Clinton (Mass.) Gas Light Company, writing under date of the 25th inst., says: "Last week you reported a change in control of the Clinton Gas Light Company. The sale has now gone so far as to reasonably assure final action thereon by the middle of November, at which time the present Board of Directors will resign, and I as Treasurer will retire. The management will be in the hands of the Light, Heat and Power Corporation, of Boston. The sale also includes the electric light plant and business of the Company. Mr. Spaulding, the local Superintendent of the Company, will retain his position."

AT a special meeting of the Directors of the Ottawa (Canada) Gas Company, resolutions of sympathy were passed to the President (Mr. John Coates) over the loss sustained by him in the untimely death of his only son.

MR. P. H. GIBBONS, formerly Superintendent of the Coatesville (Pa.) Gas Company, has been appointed to a responsible position by the United Gas Improvement Company on its Philadelphia works.

"F. R. T." is informed that the officers of the Peoples Gas Improvement Company, of Trenton, N. J., are: Directors, Ferdinand W. Roebling, John H. Scudder, Robert C. Pruyn, Watson H. Linburg, William L. Elkins, Jr., Richard Stockton, Stephen Peabody, Joseph L. Naar, John T. Van Cleef, John H. Backes, Wm. H. Brokaw, Howell C. Stull, A. C. Oliphant, J. H. Blackwell, F. F. Katzenbach and Charles A. Ford; President, Watson H. Linburg; Vice-President, William L. Elkins, Jr.; Treasurer, Richard Stockton; Secretary, Thomas D. Finletter.

THE Winnisimmet Gas Company, to furnish gas in the towns of Revere, Winthrop, etc., Mass., has been organized with a capital of $50,000. Its officers are: President, S. F. Bidsford; Treasurer, P. M. Richards.

THE Board of Trustees, of Addison, N. Y., have granted the right to operate a gas works there to Messrs. Merville Page and Murray E. Page, of Hornellsville, N. Y., and Mr. Delmar M. Darrin, of Addison. A condition of the franchise is that the rate for a gas supply on public account shall be 25 per cent. less than the rate charged to ordinary consumers. The grant is to last for 50 years, but it shall lapse unless the Company places 2 miles of mains prior to Nov. 1, 1899. The Company may supply either natural or artificial gas, but it is likely it will distribute the former.

ADDISON is a post village of Addison township, Steuben county, N. Y., and is located on Canisteo river at a point 28 miles west of Elmira. The Erie Railroad runs through it. It is quite a busy place, but its population does not exceed 2,300.

ANOTHER mysterious incorporation is reported from Albany, N. Y., where, on the 25th inst., papers announcing the formation of the New York Gas and Coke Company were filed. Its capital is returned at $500,000; its offices are to be in New York city, and its Directors are Messrs. P. H. Childs and J. A. Hawes, of New York; and F. E. Migott, of Brooklyn.

A CORRESPONDENT forwards the following: "The shareholders of the Seattle (Wash.) Gas and Electric Company, composed of Messrs. Samuel Hill, of Minneapolis, Minn.; H. W. Cannon, of New York; W. J. Murphy, of Minneapolis; and Horace C. Henry, J. S. Goldsmith, M. H. Young, J. W. Clise and Chas. R. Collins, of Seattle, recently determined, after a visit to and an examination of the works by Messrs. Hill and Cameron, to place the government of the Company in the hands of a local Board. As a result of that determination a local organization was effected by the choice of Messrs. Henry, Goldsmith, Young, Clise and Collins as Trustees for the corporation. After such election an organization was perfected by the election of the following officers: President, Horace C. Henry; Vice-President, M. H. Young; Treasurer, Horace C. Henry; Secretary and General Manager, C. R. Collins.

MR. HERBERT WYNKOOP has been named by the authorities of Brooklyn, N. Y., to supervise the operation of testing on municipal account gas meters complained of by consumers.

THE revised gas rate at Somerville, N. J., is put at $2 per 1,000 cubic feet, with a discount of 25 cents per 1,000 on the excess of 2,000 cubic feet monthly consumption.

The Market for Gas Securities.

There was a pronounced movement in city gas shares during the week, with a sharp advance in prices. Consolidated closed last night (Thursday) at 176 to 177½, and sold up to 183 before noon of to-day—Friday. Towards the close there were many sales on profit account and the price eased off to something under 182. The outlook just now is for a still further advance, especially from the point of view that a protocol for peace seems to have been arranged. New Amsterdams are stronger, but they would have been higher had the party in control thereof shown less executive ability. Brooklyn Union is steady and cheap, at 124 to 126.

Bay State looks cheap, but one may not consider at any time whether it is cheap or dear, while a certain interest predominates. Our advice is to buy it. Baltimore Consolidated, which is being steadily absorbed by a strong interest, remains at the figures heretofore quoted. Consumers, of Jersey City, is a good speculation. The St. Paul (Minn.) Company pays a quarterly dividend of 1 per cent., November 15th.

Gas Stocks.

Quotations by Frederic B. Cochran & Co., Brokers and Dealers in Gas Stocks.

20 AND 22 BROAD STREET, NEW YORK CITY.

OCT. 31.

☞ All communications will receive particular attention

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$37,730,000	100	182	183
Cental Union, Bonds, 5's	3,000,000	1,000	101	101½
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	300	312
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co.	13,000,000	100	27	28
Preferred	10,000,000	100	65½	66½
Bonds, 5's	11,000,000	1,000	100	101½
Northern Union, Bonds, 5's	1,250,000	1,000	94½	95½
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	.	107½	108½
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	125	129
Preferred	5,000,000	100	145	148
Bonds, 1st Mortgage, 5's	1,500,000	1,000	112	114
Yonkers	299,65	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	124	126
" " Bonds (5's)	15 000,000	1,000	115	115½
Bay State	50,000,000	50	2¾	3
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	..
" 1st Mtg. 5's	450,000	1,000	..	..
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	92	..
2d " " "	3,000,000	1,000	..	80
Buffalo City Gas Co.	5,500,000	100	20½	21½
" " Bonds, 5's	5,250,000	1,000	93	93½
Central, San Francisco	2,000,000	..	105	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,144,700	100	89	91
1st Mortgage	1,207,000	1,000	101	103½
Consumers, Jersey City	2,000,000	100	80	..
" Bonds	600,000	1,000	102	104
Cincinnati G. & C. Co.	8,500,000	100	202½	203
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	11,000,000	100	64¾	65
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	..
Consolidated Gas Co. of N.J.	1,000,000	100	16	21
" Con. Mtg. 5's	380,000	1,000	75	80
Consolidated G. & E. Co.'s, Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,500,000	50	65	65½
" Prior Lien 5's	4,538.000	1,000	94¼	94½
Detroit Gas Co., 5's	428,000	1,000	..	..
" Inc. 5's	34,000	100	..	..
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wa	2,000,000	..	75	80
" Bonds	2,000,000	..	88	
Grand Rapids Gas Lt. Co.	1,000,000	50	..	..
" 1st Mtg. 5's	1,125,000	1,000	..	..
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	115	125
" Bonds, 6's	2 650,000	..	106	107
Jackson Gas Co	250,000	50	..	..
" 1st Mtg. 5's	250,000	1,000	..	..
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	78	83
Bonds	1,000,000	1,000	90	91
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	48¾	49
Preferred	2,500,000	100	91	92
Bonds	10,000,000	1,000	105½	106
Madison Gas & Elec. Co.	400,000	100	..	..
" 1st Mtg. 6's	350,000	1,000	..	..
Montreal, Canada	2,000,000	100	200	..
Newark, N. J., Gas Co	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	252	..
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	53½	55
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103	103½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	180	..
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	83	..
Consolidated 5's	2,000,000		87½	90
San Francisco, Cal.	10,000,000	100	88½	89
St. Paul Gas Light Co.	1,500,000	100	50	52
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1 000	..	..
General Mortgage, 5's	2,428,000	1,000	80	82
St. Joseph Gas Co	1,000,000	100	..	..
" 1st Mtg. 5's	750,000	1,000	..	..
Syracuse, N. Y.	1,750,000	100	15¾	16¾
Bonds	1,500,000	1,000	85	89
Washington, D. C	2,000,000	20	250	
Western, Milwaukee	4,000,000	100	85½	86
Bonds, 5's	3,556,000	.	101¾	102½
Wilmington, Del.	550,000		204	206

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Values Ascertained, and Advice as to Management.

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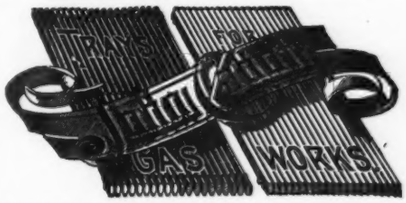

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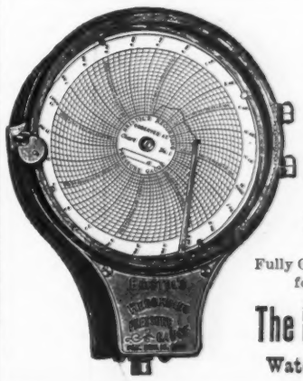

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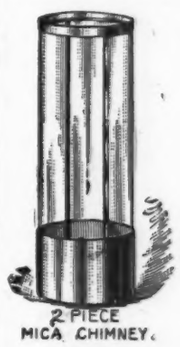

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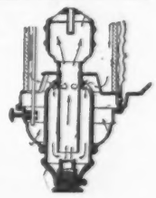

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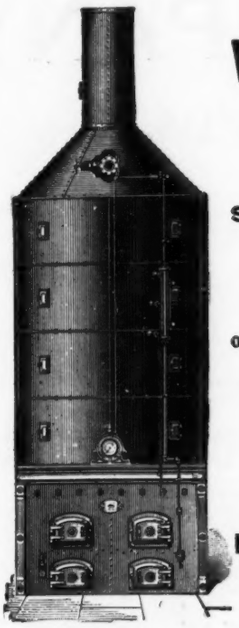

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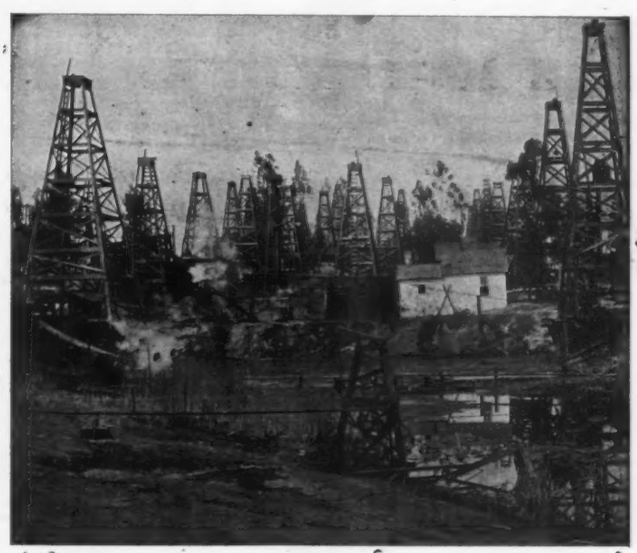

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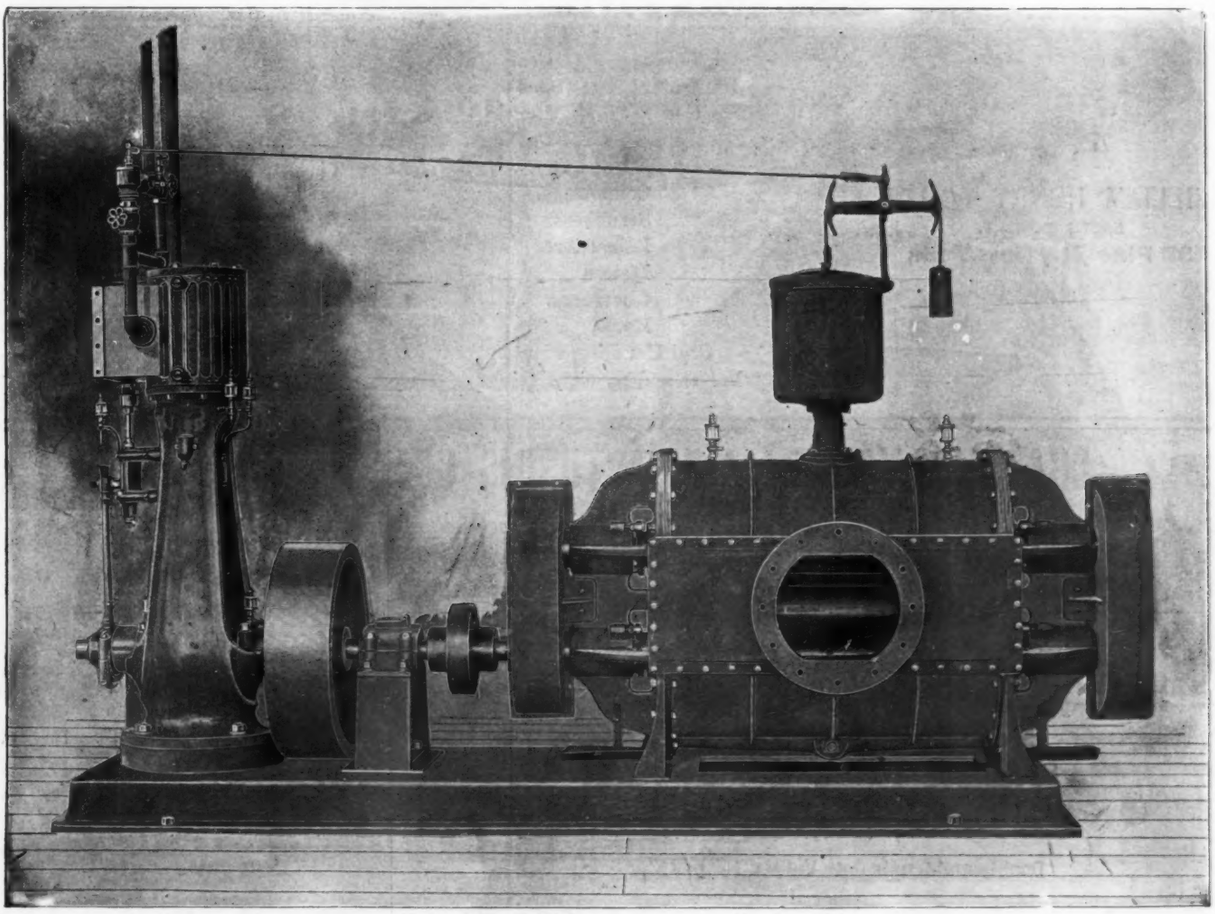

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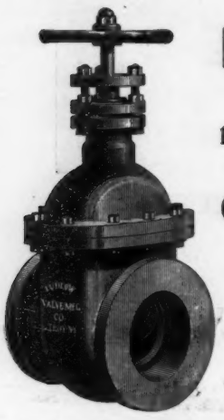

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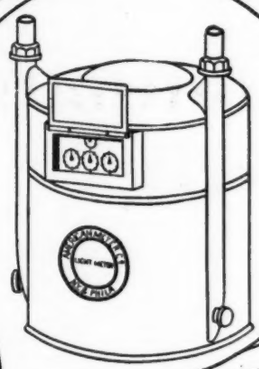

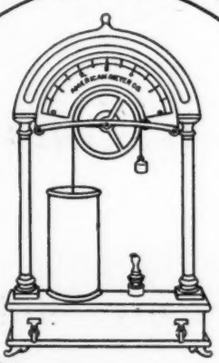

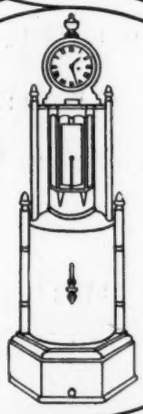

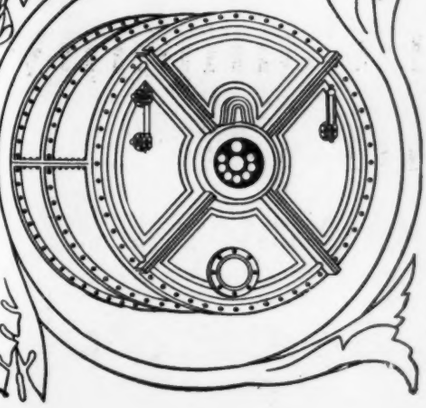

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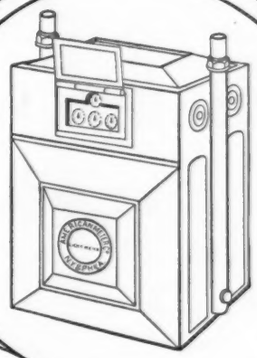

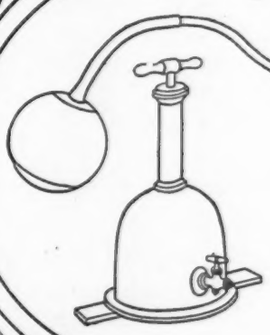

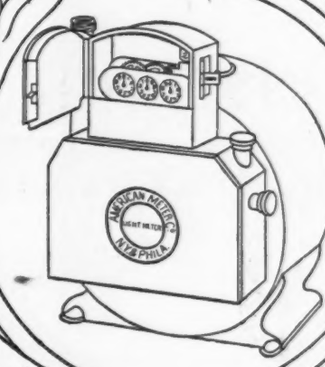

PUBLIC LIGHTING TABLE.

NOVEMBER, 1898.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	5.30 PM	8.00 PM	4.45	5.35
Wed.	2	5.30	8.50	4.45	5.35
Thu.	3	5.30	9.50	4.45	5.35
Fri.	4	5.30	10.50	4.45	5.35
Sat.	5	5.30	11.50	4.40	5.45
Sun.	6	5.20 LQ	12.50 AM	4.40	5.45
Mon.	7	5.20	1.50	4.40	5.45
Tue.	8	5.20	2.50	4.40	5.45
Wed.	9	5.20	3.50	4.40	5.45
Thu.	10	5.20	5.40	4.40	5.45
Fri.	11	5.20	5.40	4.40	5.45
Sat.	12	5.20	5.40	4.30	6.00
Sun.	13	5.10 NM	5.50	4.30	6.00
Mon.	14	5.10	5.50	4.30	6.00
Tue.	15	5.10	5.50	4.30	6.00
Wed.	16	5.10	5.50	4.30	6.00
Thu.	17	5.10	5.50	4.30	6.00
Fri.	18	8.40	5.50	4.30	6.00
Sat.	19	9.50	5.50	4.25	6.00
Sun.	20	11.00 FQ	6.00	4.25	6.00
Mon.	21	12.10 AM	6.00	4.25	6.00
Tue.	22	1.20	6.00	4.25	6.00
Wed.	23	2.20	6.00	4.25	6.00
Thu.	24	3.30	6.00	4.25	6.00
Fri.	25	4.30	6.00	4.25	6.00
Sat.	26	No L.	No L.	4.20	6.10
Sun.	27	No L. FM	No L.	4.20	6.10
Mon.	28	No L.	No L.	4.20	6.10
Tue.	29	5.10 PM	6.40 PM	4.20	6.10
Wed.	30	5.10	7.40	4.20	6.10

TOTAL HOURS LIGHTING DURING 1898.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	210.40	January	423.20
February	186.40	February	355.25
March	181.20	March	355.35
April	166.10	April	298.50
May	156.40	May	264.50
June	144.30	June	234.25
July	147.30	July	243.45
August	157.10	August	280.25
September	169.50	September	321.15
October	186.00	October	374.30
November	204.30	November	401.40
December	218.30	December	433.45
Total, yr.	2129.30	Total, yr.	3987.45

Welsbach Commercial Company,

DREXEL BUILDING,

PHILADELPHIA.

New Price Lists will be issued August 15th, 1898, and a New Catalogue about September 1st.

Correspondence from Gas Companies and the trade generally is solicited.

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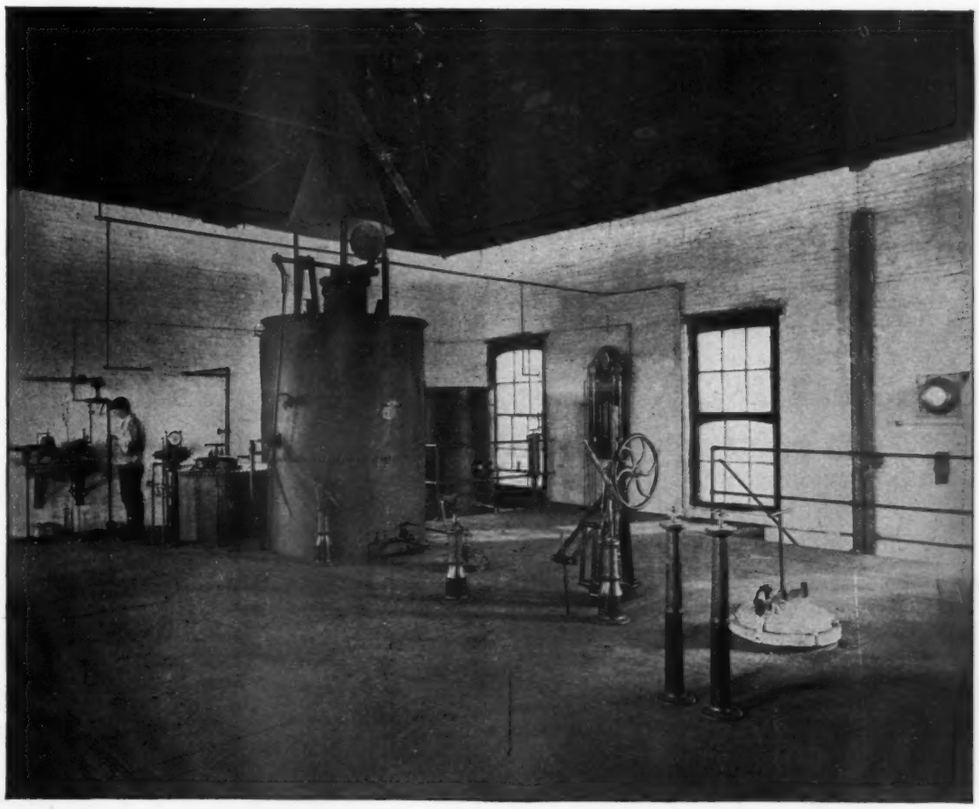

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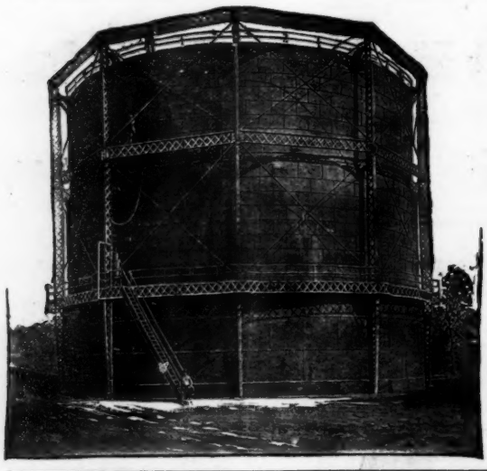

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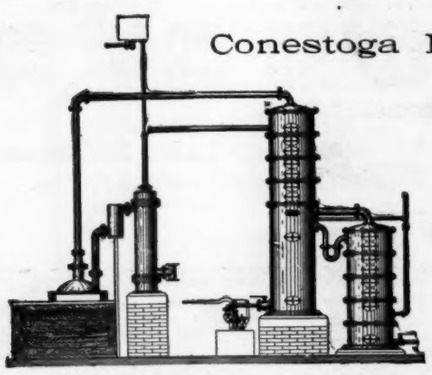

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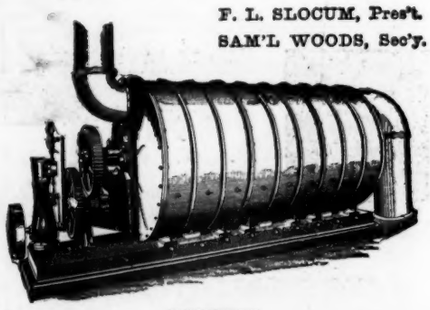

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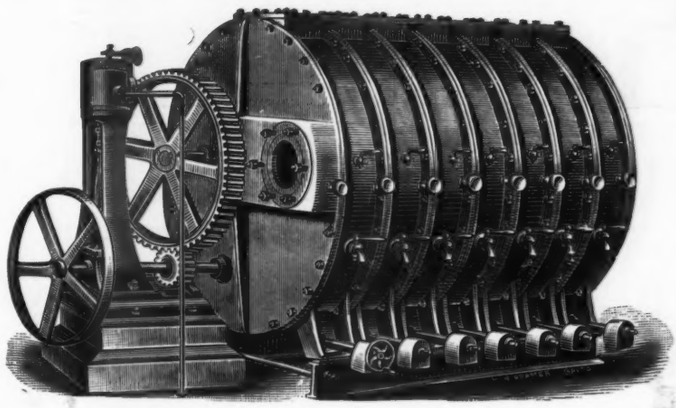

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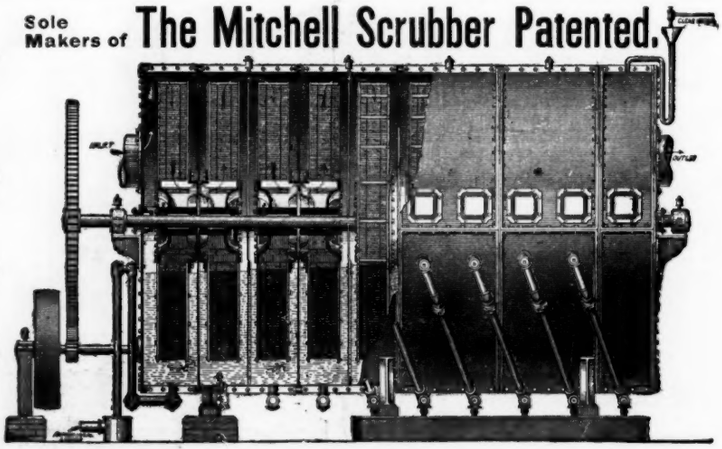

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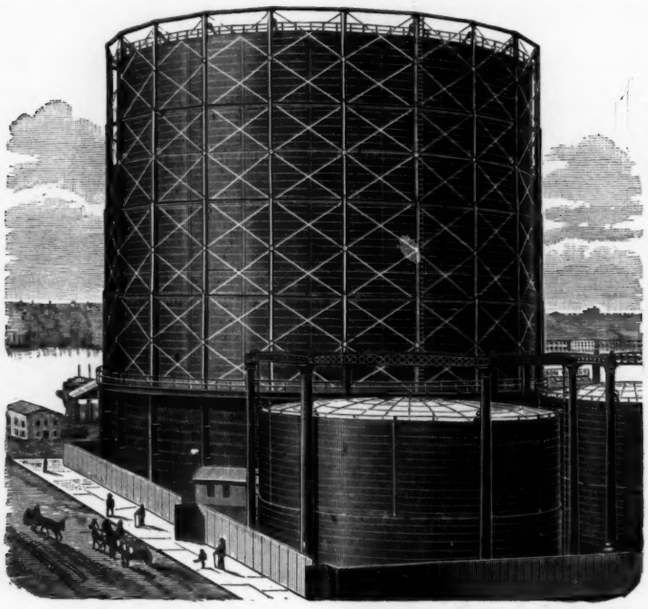

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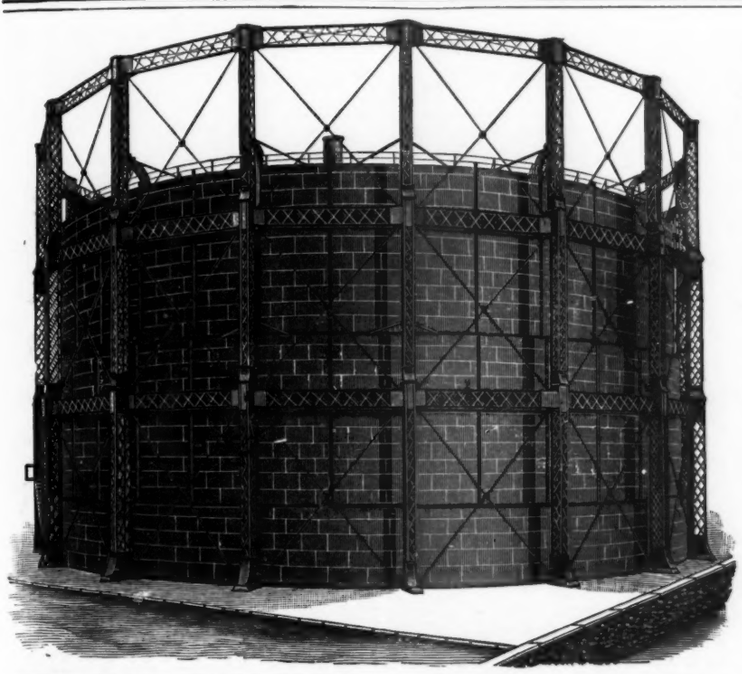

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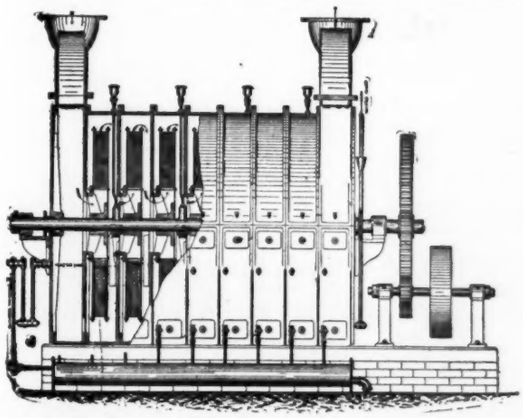

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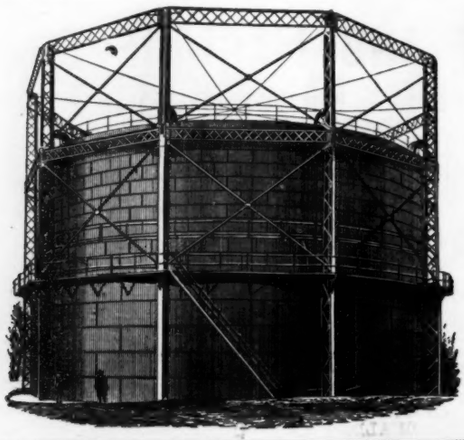

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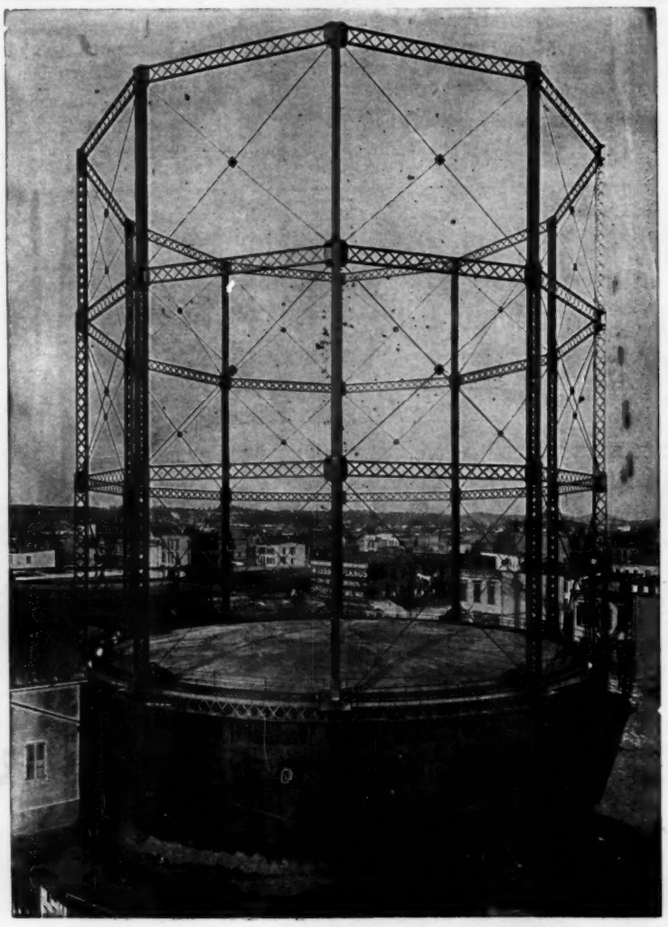

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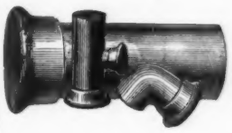

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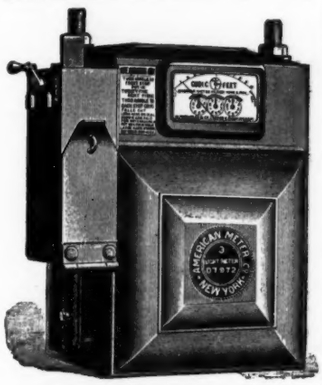

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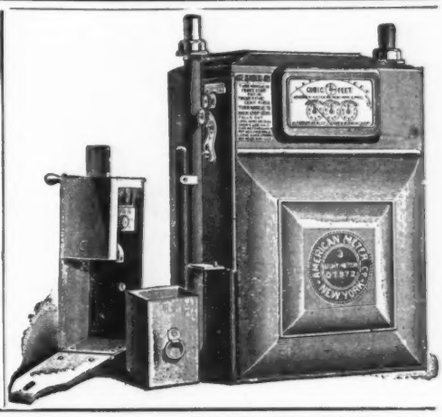

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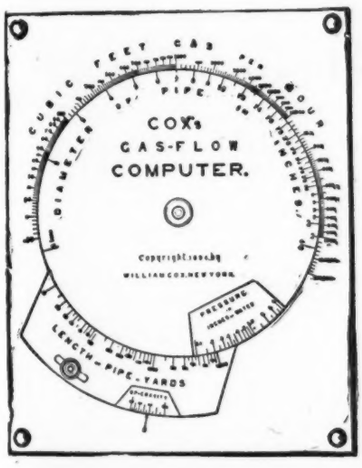

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